TECHNOLOGY DEPT.

A National Newspaper for Every Branch of the Industry

Automotive Daily News

PASSENGER TRUCK PARTS, SHOP EQUIPMENT TIRES ACCESSORIES

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First Copy

TRUCK DESIGN, COMBUSTION FEATURE S. A. E. SESSIONS

Standards Discussed at Committee Meeting: Hoffman Predicts Improved Highways And 100-Mile-an-Hour Passenger Cars

SARANAC INN, SARANAC LAKE, N. Y., June 26.—Mountain storms out of doors and pro and con discussions within the confines of committee rooms yesterday seem to have put the members of the Society of Automotive Engineers at the summer meeting here on their mettle, and today both sports and technical sessions were being indulged in with a vim, vigor and relish.

Today's session consisted of a meeting of the combustion session, presided over by W. T. Fishleigh, which brought forth a paper on combustion chamber design in theory and practice prepared by W. A. Whatmough, consulting engineer of Twickenham, England. Mr. Whatmough's paper was subjected to prepared discussions by R. N. Janeway, consulting engineer of Detroit, and Alex Taub of the Chevrolet Motor Company. Extracts of the discussions and the paper presented by Mr. Whatmough will be found on page six of this issue.

Another morning session today was the motor truck design conference, presided over by F. K. Glynn, which brought out an interesting paper by T. C. Smith, engineer, American Telephone and Telegraph Company, in which Mr. Smith pointed out the various methods of profitably extending the use of motor trucks beyond the field of transportation through the application of the vehicle engine power to time and labor-saving auxiliary devices.

The afternoon was given over to the chassis conference and in the evening the body dinner, presided over by President W. R. Strickland, was held.

Sports and out-of-door programs have been kept well up to schedule, considering the heavy rain storms which swept this section of the country on Tuesday.

The amount of discussion which featured the meeting of the standards committee yesterday indicated clearly that the visitors here are intensely interested in the program of problems to be worked out at the meeting.

All reports of the standards committee were approved by the committee itself and also by the council, but only after considerable discussion centering around the tire and rim sub-committee report regarding the advisability of tabulating certain dimensions as a guide to engineers and draftsmen. It was felt by some that this was getting too much into detail and a little outside the functions of the committee. It is expected, however, that these data will be given in the next issue of the handbook along with other standard and recommended practices adopted at this meeting.

Paul G. Hoffman, vice-president of the Studebaker Corporation, in addressing a session sponsored by the meetings committee gave the engineers his idea of the engineer's place in the production and merchandising of automobiles.

To the automotive engineer Mr. Hoffman attributed credit for the greatest changes and improvements in the lives of people during the past thirty years. He declared that the progress of the nation and its civilization depend upon its mobility. This has been true, he said, since the earliest days of its history. The automotive engineer, he added, has given the nation the mobility it so vitally needed.

He warned the engineers, however, against feeling that their task was completed, and predicted that the improved facilities for research and development not only pointed toward the improvement of the

(Continued on Page 7)

ILLINOIS ORDERS BUSES TO USE PNEUMATIC TIRES

Chicago, June 26.—Gov. Louis L. Emerson this week signed a bill requiring all motor buses operating in the state to be equipped with pneumatic tires before July 1, 1931. The Chicago Motor Coach Company, which operates hundreds of buses, plans to make the change gradually, beginning at once.

A decision just rendered by the Illinois Supreme Court upholds the validity of the 1927 ordinance regulating the maximum load for trucks operating on the city's streets. The opinion was in a test case in which the defendant was tried on a quasi criminal charge brought by the city of Chicago that one of his trucks used the streets with a load, including the machine, of 2,000 pounds more than the maximum 30,000 pounds permitted by the ordinance.

Import of Fordson Tractors From Ireland Stirs Tariff Controversy

Jordan Introduces New Lines of Eights and Sixes

By FRED KINGSBURY

CLEVELAND, O., June 26.—Edward S. Jordan, president of the Jordan Motor Car Company, today announced a complete new line of cars, consisting of two eights and one six-cylinder model and offering a choice of eleven body types, which were shown to distributors and dealers here on Monday.

The two new eights include the Great Line Ninety, in seven body types, with prices ranging from $2,395 to $2,995, and the Standard Line Eighty in a five-passenger sedan and a three-passenger coupe both priced $2,095.

The six-cylinder line, offered also in a five-passenger sedan and three-passenger coupe, is priced $1,795 for each model.

Models in the Great Ninety line include, in addition to the Playboy and Speedboy models, an entirely new sport sedan, a new de luxe seven-passenger sedan on a 131-inch wheelbase, a seven-passenger touring in new body design which is offered for export as well as domestic trade, a seven-passenger limousine and a collapsible coupe.

Policies and programs for the coming year were outlined by Mr. Jordan and John McArdle, vice-president and general manager, at the Monday meeting.

"There is the very low-priced car for the junior members of the family, and a constantly growing demand on the part of the older experienced owners for cars distinguished particularly for comfort, different in style and possessing service qualities beyond that of the ordinary car," Mr. Jordan said. "The policy of the company will be to produce this type of car for a particular class of buyers always in numbers limited to the capacity of dealers to operate profitably, and always avoiding the volume field in which competition is always extremely difficult to meet."

The schedule for the year contemplates 6,000 cars and the financial position of the company, as outlined by Mr. McArdle, showed that current assets June 1 were $1,872,850.61 and liabilities $320,643.20. This is a ratio of 8 to 1.

The net profits of the company for May were reported as $20,872.64, before Federal taxes. Net profits for the first five months totaled $120,104.58. The company last year, during the corresponding five months, had reported a loss of $420,574.

On June 1 the profits surplus of the company was placed at $981,351.

Late last year the company was reorganized and three-year debentures in the sum of $1,345,000 were given at a 6 per cent. rate. These debentures were later exchanged for common stock. This exchange has been made to the amount of $1,242,000, or 93 per cent. of the debentures exchanged for common stock.

Mr. McArdle said the organization was facing a profitable year and will show a higher profit this month as production schedules are 21 per cent. greater, and that the introduction of the new Eight, which rounds out the line, will give a gradually increasing production schedule.

One of the features of the company has been the organization of Jordan Distributors, Inc., under the laws of Maryland. This is an entirely new idea in merchandising in the automotive field. The distributors in the Eastern section of

(Continued on Page 15)

Factory Employment in May Shows Further Gain

Washington, June 26.—Industrial activity and distribution continued large in May and was accompanied by a further increase in the volume of factory employment and pay rolls, although there was a slight reduction in the output of automobiles, which has maintained a high rate since the beginning of the year.

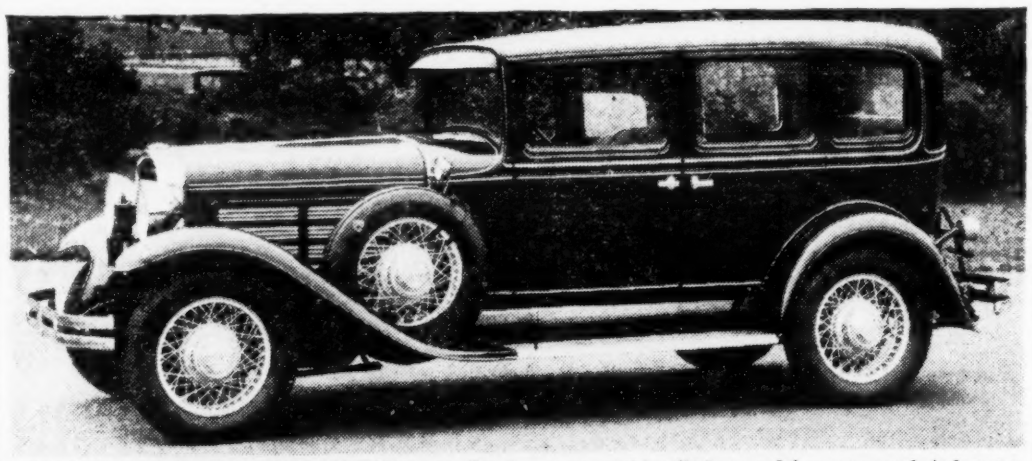
This conclusion was expressed today by the Federal Reserve Board in a general summary of business and financial conditions.

Output of the iron and steel industry increased further, and production of pig iron and steel ingots and coke was at record levels. During the first half of June, steel operations remained close to capacity, although some decline from the high rate of May was reported.

The June 1 crop summary of the Department of Agriculture indicated an increase of 43,000,000 bushels, or more than 7 per cent., in the crop of winter wheat, the report points out.

Freight shipments increased seasonally in May and continued substantially above the total of a year ago.

New Jordan Standard Eighty Sedan



ROUNDING OUT THE JORDAN LINE are the two new eight-cylinder models announced today by Edward S. Jordan, president of the Jordan Motor Car Company, Cleveland, which, coupled with the new line of sixes, are expected to materially increase the sales range of the company. Above is shown the new Standard Eighty Line five-passenger sedan, priced $2,095.

LABOR OPPOSES LOW DUTY MOVE

Senator Reed Suggests Free Entry for All Automobiles

By FRANCIS P. DAILY

WASHINGTON, June 26.—As a result of a ruling by the Treasury Department that Fordson tractors manufactured in Ireland can be brought into the American market free of duty, an interesting question has been raised with respect to the new tariff, with organized labor bitterly opposed to any movement for the removal of the duty on American cars manufactured abroad for sale in the United States.

Coming on the heels of a formal protest by Matthew Woll, vice-president of the American Federation of Labor, coupled with a suggestion by Senator David A. Reed of Pennsylvania that all duties on automobiles should be removed, William Butterworth, president of the United States Chamber of Commerce, today issued a statement declaring for a just protective tariff for American industry in order to foster America's high wage scales.

At the same time the automotive industry is placed in a peculiar situation, as it has sought to open the way clear for importation of foreign cars in order, by reciprocity, to break down the tariff barriers against American cars in foreign countries.

Nothing is known here now as to what extent the Ford Motor Company proposes to sell Irish-made tractors to the American public, if at all, but the fact that it has asked a ruling raises an interesting issue.

Last year the Ford Company established a tractor plant in Cork, Ireland. The Treasury Department has just ruled that a tractor is an agricultural implement within the meaning of the Fordney-McCumber act, which puts such equipment on the free list.

With subsidiary plants being operated by Ford and General Motors abroad, including the Opel Works recently acquired by the latter in Germany, the American Federation of Labor is apprehensive that these plants may be brought into competition with domestic-made cars in the American market if the present 25 per cent rate on automobiles is

(Continued on Page 11)

THIS ISSUE of Automotive Daily News is being placed in the hands of every well-known engineer in the automotive field. Engineers at the Society of Automotive Engineers meeting at Saranac Lake, N. Y., will receive the paper. This special distribution will continue all this week during the summer meeting of the S. A. E.

COMPARATIVE WORLD PRODUCTION AND CONSUMPTION OF MOTOR VEHICLES

	1925.	1926.	1927.	1928.
Production:				
World total	4,892,797	5,035,204	4,158,966	5,203,139
Increase or decrease, per cent.	..	+2.9	—17.4	+25.1
Amer. mfg. (U. S. & Can.) %	90.5	89.5	86.1	88.4
Consumption:				
World total	4,892,797	5,035,204	4,158,966	5,203,139
Increase in registrations	3,017,658	3,176,638	2,037,232	2,341,085
Replacements	1,875,139	1,858,566	2,121,734	2,862,054

SOCIETY FOR TESTING MATERIALS IN SESSION WITH 1,000 DELEGATES

Atlantic City, N. J., June 26.—The annual convention of the American Society for Testing Materials got under way here Monday with more than 1,000 members present, representing practically every industry in the United States and Canada. Sessions will be held here daily until Friday.

The nominations committee of the society nominated T. D. Lynch of Pittsburgh for president to succeed G. W. Thompson of New York. Mr. Lynch is consulting metallurgical engineer of the Westinghouse Electric and Manufacturing Company and served as vice-president of the society last year.

Other nominations, with election also assured through being unopposed, are K. G. MacKenzie of New York, consulting chemist Texas Company, and F. C. Clements, vice-presidents; and C. L. Warwick, Philadelphia, secretary and treasurer.

These four new members were elected to the executive committee: G. B. Haven, professor of machine design, the Massachusetts Institute of Technology; C. R. Hook, Middletown, O., vice-president and general manager of the American Rolling Mills Company; H. E. Smith, New York, engineer of materials, New York Central Railroad, and G. E. Warren, Chicago, assistant general manager, Portland Cement Association.

KENWOOD OIL CO. FORMED

Buffalo, N. Y., June 26.—Fred A. Schutz, 163 Mang St., Kenmore, N. Y., a suburb, has established the Kenwood Oil Company at that address, to distribute and wholesale motor oils, gasoline and greases.

CANADIAN RETAIL CAR SALES ARE CURTAILED

Special from A. D. N. Detroit Bureau

Detroit, June 26.—Retail automobile business in Canada has dropped off considerably during the last two weeks. Motor manufacturing plants have curtailed production and practically all the business being done is that of export work. This condition is due to the fact that farmers throughout the Dominion are from six to eight weeks behind in their work, due to the backward season. This condition, according to experts, is expected to clear up in the next few weeks, but in the meantime little is being done in a retail way.

SMITH WOOD PRODUCTS REPORTS EXPORTS GAIN

Portland, Ore., June 26.—Not only American battery manufacturers, but those of Europe, South America and Mexico are buying Port Orford cedar slabs from the Smith Wood Products Company, Inc., of Coquille, Ore. The company has been operating only a short time, but has 200 men on its pay roll and is working day and night shifts.

SYRIA IMPORTED 80% MORE U. S. MADE CARS IN 1928

Washington, June 26.—Syria imported 80 per cent. more American automobiles last year than in 1927, while the outstanding development in this foreign market was the heavy increase in trucks imported from the United States, the number reaching 362, as compared with seventy-nine in the previous year. According to a report received today by the Department of Commerce from the American consul at Beirut, imports of American passenger cars last year amounted to 931, as compared to 640 in 1927.

ROBBINS BODY CORP. TO BUILD RADIO CABINETS

Indianapolis, June 26.—Announcement of the discontinuation of automobile body building and the entrance of the company into the radio cabinet building field is made by the Robbins Body Corporation, here, through its vice-president, James A. Daugherty.

The Robbins Body Corporation is one of the oldest automobile body companies in the field and, according to Mr. Daugherty, consideration is now being given to a possible return to this work in the future, limiting the output of the company to closed type bodies. It is expected that the present body contracts will be filled by the end of this month. The cabinet output has already reached a capacity of 1,500 units a day.

CHICAGO PNEUMATIC TOOL BUSY ON SPANISH ORDERS

Franklin, Pa., June 26.—The Chicago Pneumatic Tool Company is engaged this week in making shipments of thirty-one air compressors to industrial concerns in Spain, these orders were independent of the business received through the London office of the company, which is the distributor for much of Europe. Domestic business in May was increased 10 per cent., with the Diesel engines having a large percentage of the shipments.

NEW PLANT FOR MUSKEGON MOTOR SPECIALTIES COMPANY

Muskegon, Mich., June 26.—Plant expansion, which will increase the capacity of the Muskegon Motor Specialties Company approximately 50 per cent., was authorized by the board, according to the management's report to directors. Both Muskegon plants are behind production schedules of cam shafts, and indications are that summer business will be more than sufficient to repuire the additional capacity.

MOVE TO NEW QUARTERS

Tacoma, Wash., June 26.—Wilkeson's Tire and Battery Service, Inc., operated by L. E. Wilkeson, has moved into new quarters at 718 Pacific Ave. The new building is in the heart of the city's business district. The firm distributes India tires and Prest-O-Lite batteries in this territory, and also does a tire repairing and retreading business.

SPARKS from DETROIT

By Fred Kingsbury—Detroit Editor

Automobiles and Airplanes; Scene at the Cleveland Airport

THERE is a great deal of travel this summer via airplane between Detroit and Cleveland. Some prefer the water route, where flying boats are used, and others elect to use the land planes, which arrive and depart from the Detroit and Cleveland airports.

Fred Kingsbury

Standing at the Cleveland Airport the other day, I noticed one of the Ford tri-motored planes coming in. When it landed and "taxied" up to the airdrome out stepped Fred Black, advertising manager of the Ford Motor Company, and Mrs. Black and William B. Stout, president of the Stout Air Lines.

They were on their way to Ashtabula, O., to attend the official opening of a new airport at that city.

It seems that S. C. Peterson, formerly of the tractor division of the Ford Motor Company, now a prosperous Ford dealer in Ashtabula, is chairman of the Ashtabula Airport committee.

Mr. Peterson, an old friend of the writer, admits that his love for airplanes is growing, but he intends to stay close to his first love—the automobile—and he later confided to me that practically every one at the dedication of the airport used an automobile to get there.

Wise automobile men never fail to say that the automobile and airplane do not conflict and never will. The automobile will always have its place, and this holds true of the airplane.

* * *

Alexander P. Winton Active as in Youth

LIVING in Cleveland today is Alexander P. Winton, known as one of the grand old men of the automobile world. No person would ever call Mr. Winton an old man, however, although he was the first to take an order for an automobile, make it and sell it.

The automobile was his hobby for many years, and great credit should be given him for his great development work in this field.

A number of years ago he became interested in Diesel engines and set up a separate plant and laboratory to develop and make them. It was only a short time before his Diesel engines, for marine work, became known all over the United States, and now his company is entering the airplane field.

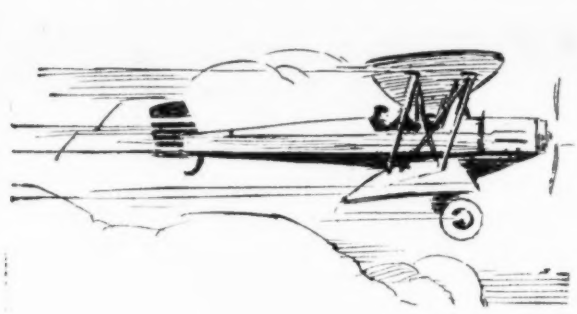
Although in his late sixties, Mr. Winton is an indefatigable worker and is at his plant many hours every day, going ahead with further development work on Diesels.

Edward S. Jordan Studies Statistics

EDWARD S. JORDAN, president of the Jordan Motor Car Company of Cleveland, is of the opinion that automobile prices may advance this year. He bases his opinion on the great value which is now being given to the public in all motor cars and the cost of materials, although large production is the main thing that has helped to keep motor car prices at a low figure.

Mr. Jordan spends a great deal of time, when not occupied with activities at his factory, in studying statistics of the industry. This is one of his hobbies and gives him a great deal of enjoyment, as well as allowing him to keep his fingers on the pulse of the business at all times.

His plant has the appearance of being a very busy place this season.

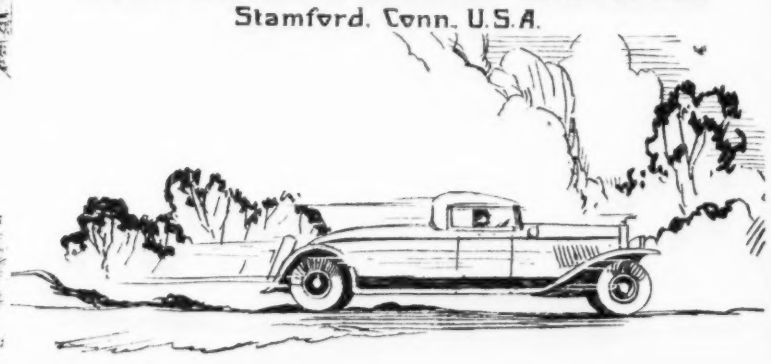


NORMA-HOFFMANN
PRECISION BEARINGS

In the full range of sizes, in Light, Medium and Heavy Series.

—"the difference in service is so much greater than the few cents in price."

NORMA-HOFFMANN BEARINGS CORPORATION
Stamford, Conn. U.S.A.



A big selling advantage

In the opinion of leading engineers and hundreds of thousands of enthusiastic owners, the Knight double sleeve-valve engine is the simplest and most efficient power plant ever designed.

The simplicity of this *patented* engine results in smooth performance, sustained high speed, rugged endurance, remarkable operating economy and unusual freedom from adjustments and repairs.

Willys-Knight dealers enjoy the big exclusive advantage of selling the only low-priced car powered by this superior engine—the beautiful new Willys-Knight "70-B."

WILLYS-OVERLAND, INC., TOLEDO, OHIO
WILLYS-OVERLAND SALES CO., LTD., TORONTO, CAN.

NEW STYLE
WILLYS-KNIGHT

News of Activities in the Truck and Bus Field

Gibbons Outlines Diesel Truck Engine Progress At A. S. M. E. Meeting

STATE COLLEGE, Pa., June 26.—At the second national meeting of the oil and gas power division of the American Society of Mechanical Engineers and the third annual oil power conference of the Pennsylvania State College, being held the first four days of this week here, C. H. Gibbons of the Marion Steam Shovel Company, today outlined the commercial applications of Diesel power plants.

Mr. Gibbons pointed ou that while there have been no commercial applications of this type engine to trucks in this country, they have been extensively used for this purpose in Germany for a number of years.

"One builder of high-speed Diesels in this country has installed one of his engines in an ordinary four-ton truck," said Mr. Gibbons. "This was accomplished without extension of hood or change in radiator. In fact, in winter it was necessary to use more radiator cover than was used on the gasoline trucks in order to maintain the proper temperature.

"In competitive service for the past three years and in the hands of regular truck drivers and at temperatures ranging from 10 degrees Fahrenheit to 95 degrees Fahrenheit, this truck has shown a fuel-consumption ratio of 3 to 8, as compared with a similar gasoline-equipped truck and a lubricating-oil-consumption ratio of 3 to 4. Or with gasoline at 20 cents and Diesel oil at 6 cents per gallon, the fuel costs are as 1 to 9.

"The Diesel-engined truck is particularly effective on the hills, as its speed-torque characteristic is much better at low speeds than that of the gasoline engine. This results in less gear shifting and in smoother operation. The distance covered per gallon was 10½ to 11½ miles.

"While not exactly a commercial application, the following record should be included. A 5½-ton Diesel-powered truck made a round trip of 1,500 miles from New York to Detroit. This truck was motored by a 70-h.p., 6-cylinder, 105-mm. bore by 165-mm. stroke Diesel, running at 1,300 r.p.m. (18.6 m.p.h.). It consumed 115 gallons of furnace oil and 1 gallon of lubricating oil, or about 13 miles per gallon of fuel.

"The engine showed a fuel consumption at full load of 0.456 pounds per b.h.p.-hr. In handling, both on the open road and in congested city traffic, flexibility equal to that of the usual gasoline truck was readily had, while on the hills the Diesel was noticeably better than a similar gasoline-powered unit. This follows, of course, directly from the better speed-torque characteristics at low speeds of the Diesel engine over those of the carburetor engine."

Dallas, Tex., June 26.—H. G. Mustard has been named manager of the F.-D. Equipment Company of Dallas, distributor of Fordson tractors and Ford products, succeeding H. L. Burleson, resigned, who has become manager of the Ferris Tractor Company, distributor of United Tractors.

New Indiana Truck Home in Dallas

NEW HOME of the Indiana Truck Corporation branch at Dallas, Tex., is shown above. This new building is located at 4131-39 Commerce St., and is one city block in length with the service department facing the street at the rear of the building. The building also affords one of the largest salesrooms in the section. Lee Turney is manager.

ILLINOIS RULES THAT TOWNS CAN'T CONTROL REGULATION OF BUSES

Springfield, Ill., June 26.—Regulatory power over buses is vested solely in the Illinois Commerce Commission, according to an opinion this week of the Supreme Court, which knocked out the fight of the municipalities to establish their right to enforce regulations upon intrastate and interstate buses through their cities. The opinion reversed a previous one which gave the cities that power and many municipalities throughout the state were preparing to exercise control. Justices Oscar E. Heard and Clyde E. Stone dissented from the majority opinion of the court.

The case was that of the Chicago Motor Coach Company against the city of Chicago, the bus firm appealing from a Cook county decision which denied its petition for injunction against the city ordinance.

WHITE BRANCH, COLUMBUS, OCCUPIES NEW HOME

Columbus, O., June 26 (U. T. P. S.).—The Columbus branch of the White Company is now occupying a new salesroom and service station at Skidmore Street and Town Street. The new structure, of steel and brick construction, has a large service department in the rear and the showrooms and offices in the front. The Columbus branch distributes White trucks over Central Ohio. A. C. Bowser is manager of the branch.

PACKARD ADDING TO N. J. SERVICE BUILDING

New Brunswick, N. J., June 26.—The new building of the Packard Motor Service Corporation on Jelin Street is expected to be completed by July 15. The building is to be of face brick and reinforced concrete, two stories in height and completely fireproofed. It is to be used entirely as a service garage for Packard owners.

With the completion of the new unit the Packard Corporation will have a continuous frontage of 132 feet on Jelin Street and a depth of 175 feet to Schuyler Street. Two ramps will provide access to the upper floor of the service station. The building will have a capacity of 125 cars.

MADDEN BROS., INC., ADD TWO MORE TRAILERS

Duluth, Minn., June 26.—Madden Brothers, Incorporated, operating an automobile truckaway service between Duluth and the twin cities of St. Paul and Minneapolis, which embraces a fleet of thirteen trailers, each capable of handling eight automobiles, has just added two more trailers, each one being sixty-five feet long. Madden Brothers, Incorporated, handle automobiles brought to Duluth by the Minnesota-Atlantic Transit Company.

Hartford, Conn., June 26.—Louis Bogin, formerly associated with the Buick service interests in this territory has opened a service station at 56 Oakland Terrace. He will specialize on Buick service.

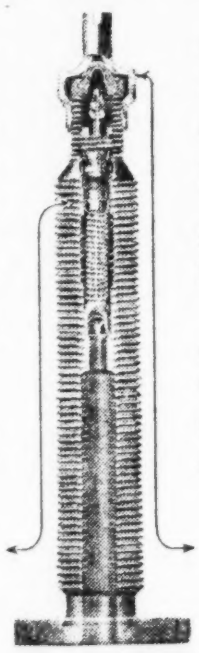
Millions of Schrader Valve Insides

and every one made with watch-like precision

MILLIONS of Schrader Valve Insides are giving satisfactory service throughout the world. Ever since the early bicycle days, the Schrader Valve Inside has held air in tires so well that millions of users have hardly given it a thought. They have depended on its reliable service as a matter of course.

Thus it was through sheer merit that the Schrader Valve Inside won world-wide popularity. Today, with every improvement to meet the increasing demands of service, the Schrader Valve Inside is still recognized as the most efficient device for holding air in tires.

It is a scientifically constructed mechanism made with watch-like precision according to sound, proven principles of air control.



The red rubber seat washer is the vital part of the Schrader Valve. At this point the valve opens to admit air, and closes to retain it. The valve will remain air-tight if this seat washer is clean and in good condition.

The Schrader No. 880 Valve Cap is the second protection against the escape of air. It seals the mouth of the valve stem and prevents a loss of air even though the valve inside may be damaged or worn out.

A. SCHRADER'S SON, Inc., BROOKLYN, Chicago, Toronto, London

TIRE VALVES Schrader TIRE GAUGES

Makers of Pneumatic Valves Since 1844

Automotive Daily News

"Of, By and For the Entire Automotive Industry"

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April's Record

FINAL registration figures for the month of April, which were published a few days ago in Automotive Daily News, are unusually interesting. The revised total of 481,896 motor vehicles registered throughout the country establishes a new record for a month. Last year the April registrations were 332,180 vehicle units. This is a gain of 149,716 vehicles, which is 45 per cent.

Oddly enough, Ford production in April was 144,750 just about the amount of the gain over April, 1928. Last year the output from the Ford plants was only 48,443 vehicles.

The Ford production represents about 30 per cent. of the total registration for the country.

In all probability May will show another heavy registration figure and June will also be high. Production is tapering off somewhat. Ford has dropped down 500 units a day, and there is no question that other manufacturers will also cut, now that the peak demand has been met. Some factories are already swinging into production on new lines, and the production curves of these will show a downward tendency until the new models begin to sell.

New Names

THIS year has added a number of new names to the automotive vehicle list. At the very beginning of the year we welcomed the Black Hawk and the Roosevelt, good Hoosiers both from the plants of Stutz and Marmon. A little later we shook hands with Windsor, sponsored by the pioneer Moon organization. Then Oldsmobile gave us a Viking and Walter Chrysler went back into American transportation history for the name Fargo for his new delivery line. De Soto and Plymouth belong to 1928, but they are new names in the automotive list, with a fine historical tang.

Within the next few weeks we are going to have the name "Dover" to add to nomenclature of the commercial field, the Hudson organization having decided to christen its forthcoming commercial line in that way.

It has been a good many years since so many new names have appeared on the automotive banner, and, best of all these newcomers have all received a hearty welcome.

Chinese Fashion

OVER in China they have a bland way of solving some problems that bother all the world, and doing it with just a pinch of common sense. For instance, it is the immemorial Chinese custom to pay the doctor a monthly fee for keeping one well. When the customer falls ill the doctor's fee ceases until he has restored his client to health. If that isn't common sense we do not know what is.

In the city of Tsinan, China, the Federal Motor Company has a distributor, the Sung Chuan Tien Company, which struggled for some time with the problem of excessive repairs. Then the company dropped in a pinch of common sense and solved the problem. The drivers handling the Federals were paid a bonus of ten or fifteen dollars for every month that their vehicles did not have to go into the repair shop. The effect was instantaneous. The excessive repair bills were cut to the inevitable minimum, the drivers are happy and do their best to avoid accidents or failures, because it is to their pecuniary interest to do so.

And now is the season when the jovial traffic cop gets out his little pad of invitations and makes the little slips personal by a scribbled memorandum. A little care and forethought are much to be preferred to a non-social meeting with the judge.

News In The Jobber Field

Jobber of Little Rock, Ark., Holds Merchandising Meet

LITTLE ROCK, Ark., June 26.—**The 555 Inc., N. S. P. A. jobber of the city, sponsored a merchandising meeting recently which was unusually original in a number of respects.**

In the first place, the meeting was held in Rainbow Garden, the company's auditorium, which occupies the roof of their half-block square building.

Secondly, the success of the meeting was partly due to the advertising, which included broadcasting over their own radio station, KLRA.

And, finally, the entertainment was featured by the playing of the 555 band of fifteen pieces, all members of the 555 organization.

Tom Duggan, merchandising service director of the N. S. P. A., gave his illustrated talk, "Shop Profits," which was enthusiastically received by the crowd, which numbered more than five hundred.

This meeting was for the purpose of getting a little closer to their trade and at the same time to not only enjoy the atmosphere of good fellowship, but to also give them an illustrated story with some facts about their business which would help them ring their cash registers and improve conditions on a whole. To also mix a little pleasure with business, the committee was responsible for the entire program and arranged a very entertaining one.

The committee was composed of E. F. Nedved, general sales manager; B. E. Smith, manager automotive division; Paul Sowell, sales manager parts division; A. L. Derryberry, sales manager equipment division, and Frank Burke, radio division.

A Southern barbecue was served after the completion of the program, and there was distribution of a number of prizes.

COMING EVENTS

JUNE

24-28—**Atlantic City, N. J.** American Society for Testing Materials' annual meeting.
25-28—**Saranac Lake, N. Y.** Society of Automotive Engineers' summer meeting.
30—**Le Mans, France.** French Grand Prix.

JULY

1-2—**Buffalo, N. Y.** American Automobile Association convention.
16-27—**London, England.** Olympia International Aircraft Show.
17-19—**Minnesota.** Motor Trade Association meeting at Breezy Point Lodge.
22-23—**Cincinnati, Ohio.** National Team & Motor Truck Owners' Association annual convention.
25-26—**Chicago, Ill.** National Association of Show Managers' meeting.

AUGUST

24-Sept. 2—**Cleveland, Ohio.** National Air Races and Show.
26-28—**Cleveland, Ohio.** Society of Automotive Engineers aeronautic meeting.

SEPTEMBER

7-15—**Chicago, Ill.** International Aircraft Exhibition.
9-13—**Cleveland, O.** American Society for Steel Treating. Eleventh Annual Convention.
9-12—**Cleveland, O.** American Welding Society. National Fall Meeting.
9-12—**Cleveland, O.** Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. National Fall meeting.
9-12—**Cleveland, O.** Iron and Steel Division, American Institute of Mining and Metallurgical Engineers. National Fall Meeting.
9-13—**Cleveland, O.** National Metal Exposition at Public Auditorium.
9-13—**Cleveland, Ohio.** First Annual Metal Congress.
11-13—**Cleveland, O.** Iron and Steel Division, American Society of Mechanical Engineers. National Fall Meeting.
15-21—**Springfield, Mass.** Eastern States Exposition.
28-Oct. 4—**Atlantic City, N. J.** American Electric Railway Association Convention.
30-Oct. 4—**Cleveland, O.** National Machine Tool Builders' Association Convention.

OCTOBER

2-4—**Cleveland, O.** Society of Automotive Engineers' Production meeting.
3-13—**Paris, France.** Automobile show.
12—**Tulsa, Okla.** Oklahoma Tire Dealers' Association meeting.
16-18—**Detroit, Mich.** Society of Industrial Engineers Convention.
17-26—**London, Eng.** Automobile show.
23-30—**Prague, Czecho-Slovakia.** Automobile show.
29-Nov. 22—**Tokio, Japan.** World Engineering Congress.
—**Sioux City, Iowa.** Automobile Merchants' Association Convention.

DECEMBER

3-5—**Chicago.** American Oil Men's Association Exhibit at Hotel Congress.

Editor's Column

FEW automotive jobbers fully appreciate the value of Uncle Sam's air mail service in the conduct of their business, we believe. This service is being constantly extended and constantly improved, and now can be employed to save a great deal of money for rush orders and the like.

Once upon a time, air mail was pretty uncertain because the sender used to sit and worry about whether his letter got through or not, but those days are now behind us, and mail planes don't crack up at unexpected points along the line.

We're pretty certain that if the average wholesaler would take an hour or two off and dig into local flying schedules, delivery time from point to point, and cost, he would come out of it pretty well satisfied that his time had not been wasted, and would make greater use of the air mail.

"Practically all of our orders for special merchandise are carried by the air mail," says R. W. Wright, office manager of the Gall Auto Specialty Company, Denver, Col. "We find that, while it may be a trifle slower than the telegrapn, there is less chance of mistakes in filling the order inasmuch as there might be an error in the transmission of a telegram.

"On the other hand, you should watch the newspapers to see that a plane carrying, perhaps, your letter is not wrecked and the order destroyed along with other mail by fire. We had a sad experience of this sort once and it lost us a good customer.

"We still have to use the telegraph for many of our special orders, because a telegram is faster than the air mail, but on Saturdays practically every special order goes air mail for the reason that the order would not be handled by the factory until Monday, anyway, and an air mail letter would be delivered to the factory the first thing Monday morning, after traveling from Denver by plane on Sunday.

"Many of our regular orders go by air mail, too. About 50 per cent., which makes it possible for us to hold our inventories down a bit closer and increase our turn over a wee bit faster. There is a difference of only 3 cents in postage, which is a small matter in comparison to the time saved.

"Thus far we have not found it practical to send merchandise by air mail or to instruct the factories to send goods to us by this method, because the items are usually too heavy and the postage amounts to too much in comparison to the value of the part."

BILL'S AUTO ACCESSORIES TAKES ON TWO TIRES

Jacksonville, Fla., June 26.—Bill's Auto Accessories Store, one of the south's oldest tire and accessory stores, will handle the Marathon and Runner tires through the three stores in Jacksonville, succeeding the Chain Tire Stores, 324-26 W. Forsyth St., which has withdrawn from the retail field.

GETS CITY CONTRACT

Atlanta, Ga., June 26.—The Prior Tire Company has been awarded the contract to furnish all pneumatic and solid tires to be used by the city. Virtually every dealer in standard tires in Atlanta placed bids for the business.

PARTS FIRMS MERGE

Omaha, Neb., June 26.—The progressive Auto Parts Company has been absorbed by the Nebraska Auto Parts Company and both stores will continue to operate under their old names. The Nebraska Auto Parts store is entering the used car field while the other shop will carry parts only.

Southwestern Jobbers Hold 2-Day Session, Outing at Springfield, Mo.

Springfield, Mo., June 26.—The Southwestern Automotive Jobbers' Association, including jobbers from Kansas, Missouri, Arkansas and Oklahoma, concluded a two-day session at Springfield, Mo., recently at the Kentwood Arms Hotel.

Members of the Booster's Club of Kansas City, were invited guests on that occasion, as well as wives and children of the visiting jobbers. All but two of the members of the association were present, and over fifty were in attendance at the entertainment features, provided by the Springfield hosts.

The entire group was taken by the Sprinfield jobbers in automobiles, for a circle tour of the Ozarks, including Branson, Hollister, Forsythe and Rockaway Beach.

The group enjoyed a dinner at the Cliff House, later a launch ride on Lake Taneycome, and later a dinner at Old English Inn, at Hollister, Mo.

Harry D. Howard, the president, as well as Phil C. Huffman, the secretary, were enthusiastic about the results accomplished at the conference.

Special guests were Walter C. Hecker of the Curtis Manufacturing Company, St. Louis, who spoke on "Competition;" B. W. Ruark, assistant commissioner of the MEA, on the recent accomplishments and work program outlined by the directors of the MEA.

The Southwestern jobbers will meet in October, at Dallas, Tex., together with the Texas Jobbers Association.

BUILDING 500-CAR GARAGE IN ALBANY, N. Y.

Albany, N. Y., June 26.—An addition to double the present facilities of the Arnink garage in Albany is being built. When this is completed the establishment will have a capacity of more than 500 cars. The structure will be four stories, concrete and brick, and of the same design as the present building. It is planned to have it finished by November 1.

The cost of this project will be more than $150,000. Harry Knickerbocker is president of the Arnink company.

ATLANTA TIRE DEALERS NAME NEW OFFICERS

Atlanta, Ga., June 26 (By U. T. P. S.).—At a recent weekly meeting of the Atlanta Tire Dealers' Association Ben R. Firestone, manager of the Silver Tire Company, was elected president, and Everett Strupper, of Everett Strupper, Inc., was elected vice-president, the association having accepted with much regret the resignations of President E. H. Steele and Vice-President Al Bailey.

HOTEL MONTCLAIR
49th to 50th Sts., Lexington Ave.
New York City
800 Rooms
Each with Tub and Shower
Radio in Every Room
ROOM AND BATH
Tub and Shower.....$3 to $5 per day
For 2 persons.....$4 to $6 per day
SUITES, $8 to $12 per day
Special Monthly and Yearly Rates
3 minutes' walk from Grand Central, Times Square, Fifth Avenue Shops and most important commercial centers, leading shops and theatres. Ten minutes to Penn. Station.
Grand Central Palace only 2 short blocks away
S. Gregory Taylor
President
Oscar W. Richards
Manager

Aviation Daily News

COAST-TO-COAST TRIP IS OUTLINED

Ernest I. Lewis Makes Air-Rail Journey Under 2 Days

WASHINGTON, June 26.—Ernest I. Lewis, chairman of the Interstate Commerce Commission, left Washington on the evening of June 23 to be a passenger on the preliminary ocean-to-ocean trip of the rail-and-air line via the Pennsylvania Railroad, the Transcontinental Air Transport, and the Atchison, Topeka & Santa Fe Railway, laid out by Col. Charles A. Lindbergh, which is to be placed on a schedule basis early in July.

The schedule calls for trips between the Atlantic and Pacific in a little less than two days.

Mr. Lewis left Washington at 6:30 p. m. on a train that reached Columbus, O., the next morning at 8.15, where he transfered to a Transcontinental Air Transport plane for Waynoka, on the Oklahoma-Kansas line, at 6.39 p. m. There transfer was made to a sleeping car on the Sante Fe for Clovis, N. M., where transfer was made back to a plane, arriving at Los Angeles at 5.52 p. m. on June 25. Various stops were made.

"The government has not extended our regulation to the realm of air transportation," said Chairman Lewis before his departure, "but all who have to do with transportation are interested in following closely the rapid strides now being made to bring more closely together all parts of this continent.

"We now seem to have reached the point where persons living on either seaboard can travel to the opposite ocean and visit or transact business in its cities and be back home in less than a week.

"I am particularly interested in this new development because I was one of those under the leadership of Carl Fisher who pioneered the first transcontinental automobile route. On that trip, less than two decades ago, we took almost a month to go from coast to coast. Seeing what has transpired in so short a time since the opening of the transcontinental highways, can one venture a prediction of what will come in the next ten years, or even shorter time, in the opening of air routes over this country?"

CURTISS BUYS AIRPORT SITE AT HOUSTON, TEX.

Houston, Tex., June 26.—The Curtiss Airports Corporation of New York has announced the purchase of a 450-acre tract on the old Main Street road two miles south of Rice Institute for a consideration of $500,000. The tract will be improved at once and will be used for an airport with hangars, a flying school and an aviation service center.

WOODWORTH LUBRICATING SPRING COVERS MAKE EASY RIDING CARS

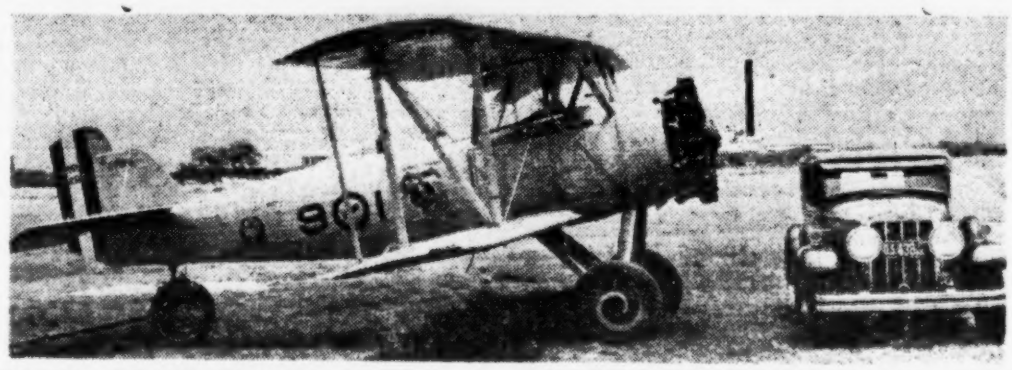
Woodworth covers for the Jobbing trade are adjustable in both length and width, so that a stock consisting of only a few sizes is needed to fit all cars and there is no danger of having unsalable covers on hand.

FOR AUTOMOBILE MANUFACTURERS, WOODWORTH Covers are enlarged at the clips and have no seams along the corners of the springs to rip out or leak oil. They can be fitted in a moment and make a very neat and smooth appearance.

Artificial leather covers list at from $2.00 to $7.00 per set. Genuine leather covers at from $4.00 to $14.00 per set. Liberal discounts to the Trade.

WOODWORTH SPECIALTIES CO.
Manufacturers
Binghamton, New York

Air-Cooled Plane and Car, Field Companions



VOUGHT CORSAIR BIPLANES powered by air-cooled radials serve the United States Marine garrison in Haiti. The photograph which was taken at Bervis Field, Marine Corps Airport at Port-au-Prince shows one of these air-cooled ships in company with an air-cooled Franklin Coupe recently purchased by Col. L. Mason Gulick, commanding officer of the First Marine Brigade which comprises the present garrison.

THOMPSON AERONAUTICAL, TAKES OUT INSURANCE POLICIES FOR $4,000,000

Chicago, June 26.—Insurance policies covering a potential total liability of $4,000,000 have been issued to the Thompson Aeronautical Corporation, according to W. E. Close, treasurer of the company. The policies include the same protection as is available to other common carriers. They insure not only passengers but the entire fleet of twenty-one planes. The insurance was handled by the Neal-Phypers Company of Cleveland. Nearly every form of insurance is carried, including fire, tornado, theft, public and passenger liability and property damage.

GRAHAM-PAIGE DEALER

Buffalo, June 26.—The Ontario Motor Sales Company, 3490 Ontario Avenue, Buffalo, has been awarded a Graham-Paige dealership and will feature this line hereafter.

Whatmough Speaks on Combustion Chambers

Paper Outlines Design In Theory and Practice

IN his interesting paper on the theory and practice of combustion chamber design, W. A. Whatmough, consulting engineer of Twickenham, England, points out the difference between scientific and industrial progress as manifested ni heat theory and engine design and the Carnot and Otto cycles. His discussion on the working principles of combustion is presented in part herewith, as read at the S. A. E. meeting today.

By W. A. WHATMOUGH

MY criticisms of heat theory have hitherto been incidental to a detailed discussion of the problem of engine knock. During the comprehensive review in question, thermal exchanges between the burning mixture and its enclosures, including unburnt combustible, were shown to control flame speed and pressure rise. It was discovered that temperature and pressure combine into a mobile or dynamic physico-chemical equilibrium. Instead of heat being continuously degraded to a degenerate stage, the contents of any enclosure are continually receiving and exchanging energy. The articles in question conclude with a compendium of terms, in both simple and scientific language, explaining combustion as met with in engine practice.

The mechanics of combustion simplifies into a rise and fall in working pressure due to an enormous succession of momentary phases of emission of radiant, or heat, energy. A series of snapshots of flame travel traces the path of inflammation as instantaneous states of incandescence. Automobile engineers who have difficulty in following the descriptions of flame propagation should remember that my task was the unenviable one of portraying a motion picture of a strange technology, with ultra-scientific titles, by stationary photographs and simple language. A clear understanding of the sequence of events leading to the smoothing of engine torque is the prime need in combustion-chamber design. Incidentally, torque is one of the few words including coupled action in its meaning.

The connection between piston movement and the pressure rise synchronizing with flame travel should be readily visualized from the following simple synopsis of internal combustion:

1. Heat is generated by burning air carbureted with hydrocarbon vapor, the evolution of energy occurring during the chemical reunion of atoms.
2. Flame travels just as fast as energy becomes available to fire fresh charge.
3. The flame front is a surface extension of inflammation during normal combustion.
4. Spontaneous combustion, or auto-ignition, is due to combustible becoming heated throughout its volume to its self-ignition point.
5. The flame thrust is smooth or uneven or rough according to the timing of the rate of inflammation.
6. The working parts are stressed in accordance with flame speed.
7. Regulated burning is characterized by steady or steam-like propulsion.
8. Shock loading of piston and rough running result from unduly rapid pressure rise.
9. Engine knock is reaction to high-speed projection of flame, due to auto-ignition subsequent to spark ignition.
10. Heating combustible increases flame speed.
11. Cooling compressed charge slows flame travel.
12. Overheating part of combustible during compression by flame front may lead to engine knock.
13. Overheating prior to sparking causes pre-ignition.
14. Overcooling leads to (a) fuel deposition during compression (b) failure to fire and (c) quenching of flame after firing.

Inversion of a theoretical cycle into a working cycle adequately summarizes what has been already mentioned in this and other previous papers. Results obtained by applying the foregoing principles to engine construction bear out their practical utility.

Interpretation and Misinterpretation

Correct interpretation of effects due to changes in detail design are vital to real progress in engine development. A modification based upon a particular theory often fails to produce consistent results in practice, because a given clue does not lead to the cause of trouble and its cure.

Cooling and-or warming of the charge is the one sure guide to that balancing of many otherwise mysterious flow factors entering into combustion-chamber design. Conclusion deduced from combustion-chamber shape will mislead whenever they do not conform with the heat control, which is the one decisive factor in that regulated burning which smooths power output and increases engine efficiency.

Reduction in likelihood of engine knock by burning the hottest mixture first is merely incidental. Flame speed, or rate of burning, varies with the degree of admixture of fuel-air mixture as well as its temperature. A wet, or saturated vapor and spray, mixture burns in gasoline engines with a sooty white flame, designated as dirty combustion, unless the mixture becomes gaseous or dry during the compression stroke, when clean burning results. Furthermore, impoverishment or enrichment of the combustible by gaseous hydrocarbons slows burning and flame travel. Paradoxically, slow burning, in exhaust, arises from uneven running, with over-cool mixtures, and over-rich mixtures, due to overheating.

Regulated burning thus requires mixture-quality control as well as limitation of heat added to the charge. Indeed, the marvel of the internal-combustion engine is that engine rhythm and tune are possible with a variable-speed engine carbureted with sprayed droplets of fuel. However, the inclusion of heat in air in proportion to that disappearing as latent heat of evaporation solves the distribution part of the problem.

Another comparatively unrecognized proviso, however, is that liquid fuel should not deposit during compression. Crankcase-oil dilution indicates whether this is a regular occurrence or not, but a glance at the combustion chamber will tell its own tale in many ways and stop unchecked theorizing.

Turbulence is the theoretical explanation for increase in flame speed by more or less violent agitation of the combustible during the compression stroke. In practice the turbulent L-head permits an increase in compression ratio whereby it develops more power. However, its vagaries in regard to roughness of running discount its supposed antiknock properties. Undoubtedly the speeding up of inflammation attributed to turbulence is due to turbulent heating or eddying contact of unburnt charge with heating surfaces.

The spark advance producing maximum power or incipient detonation can be defined as the critical spark advance and is a measure of the fastest permissible flame speed. An increase in cross-sectional area of about 22 per cent. increased the critical spark advance over three times that calculated from the corresponding reduction in compression of 0.9 ratio. The change in critical spark advance or flame speed after allowing for that attributable to higher compression ratio is approximately double the differences between the flame speeds of gasoline of high and low antiknock rating, when tested with this single-cylinder experimental engine at 6.2-to-1 compression ratio. The reduction in flame travel by minimizing turbulent heating represents a gain of two whole ratios in useful compression ratio.

The streamlined or antiturbulent combustion chamber head was developed initially to prevent turbulent heating of the exhaust valve. Likewise, firing the hottest mixture first was designed to be an additional precaution against engine knock. In practice, the combination makes the combustible burn more smoothly and more completely, while better filling increases power output as well as engine efficiency. The cooling of flame by doing work reduces flame temperature during exhaust.

An efficient non-detonating high-compression engine, despite its greater heat generation, runs cooler than a low compression, low efficiency engine.

The decision by an engine manufacturer to use a specific type of engine is dictated by some special consideration such as (a) mass production of automobiles, (b) silent, smooth and flexible luxury cars, (c) acceleration in sport models and (d) efficiency and service in commercial vehicles. Nowadays the choice normally narrows down to side-by-side valve engines for low-priced automobiles and heavy-duty motor trucks and overhead-valve engines for fast cars and low-loading motor coaches.

An all-round endeavor is being made to secure smoother running by antiknock combustion chamber heads. Another decided trend is to increase the number of cylinders and revolution rate for maximum power so as to obtain greater flexibility. Maintenance of tune and quietness in service has kept the cheaper engine in favor, despite its lower power output.

In Great Britain during the last two years a distinct trend has been noticed toward return to small-bore L-head engines at the expense of valve-in-line push-rod-operated engines, owing to the former requiring less attention. On the other hand, the introduction of high-speed long-distance motor coaches is leading to a more extended use of overhead-valve engines in commercial chassis, because the removal of the valves along with a detachable head allows a quick change-over of combustion-chamber heads without taking the vehicle out of service. Modern engines are expected to give good efficiency and power output at all engine speeds up to 3,000 r. p. m. The task is not difficult as regards either L-head or I-head engines except when the demand for smoothness and flexbility becomes insistent or even imperative, when failure or success becomes entirely a matter of control of the combustion rate.

One object of this paper is to indicate some of the limitations imposed upon induction as well as combustion following the selection of a particular form of combustion chamber and to describe how these can sometimes be partly or wholly overcome. The examples are selected for various reasons but usually to show how power output and anti-knock characteristics can be affected greatly by simple changes in the flow form of the combustion chamber.

Powerful, efficient and smooth engines meeting all trade requirements can be equipped with side-by-side valves, but a flat or extended combustion-chamber head necessitates more careful correction of heat flow or temperature distribution than engines having a rounded or more compact combustion chamber. Cooling and heating effects vary greatly during the working cycle and also in different parts of the cylinder to an extent that automobile engineers seldom realize.

The question of good and bad combustion-chamber design is mainly a matter of whether any trend toward overheating or overcooling is continuously redressed or these become exaggerated locally. In anticipation we can state that any one factor disturbing flame propagation is a prime source of engine trouble.

Considerations such as simplicity, production or power have successively determined the fashion in combustion-chamber design, but the endeavor has always been to improve the allround performance of internal-combustion engines by studying individual types ranging from early to modern forms of cylinder head. The World War divides engine developments, apart from racing engines and sport cars, into pre-war and post-war types substantially as given in Table 1.

Scale drawings of combustion chambers will be used to illustrate specific factors affecting the working of gasoline engines. The power curves are reduced to a common basis of horse power per liter to aid strict comparison. (1 h. p. per liter 0.0164 h. p. per cu. in.). All the combustion-chamber heads except one are from engines in actual production for road transport.

Simplicity in design and construction is the key to the form of combustion chamber known as the T-head. The intake is situated at one side of the central cylinder and the exhaust at the opposite side of the engine. This head consists of a chamber of even depth with the clearance space subdivided into three components, (a) lateral intake pocket, (b) central clearance and (c) exhaust-valve cavity.

In this engine, during the periodic displacements of the piston, the inlet valve and pocket are cooled by evaporation of ingoing fuel and the exhaust-valve head is heated by flame. Whenever the central combustion chamber proper is cool enough to avoid auto-ignition, the intake acts as a condenser, whereas when hot enough to prevent fuel deposition the exhaust pocket is particularly likely to become a detonation heat trap.

Interference with the flow of cooling water by valve caps and cylinder plugs, cast-iron pistons, high-temperature exhaust and residual gases and thermosyphon cooling all combine to make the engine run hot, as shown by its low compression ratio, 4 to 1. The spark plug on the inlet side fires across the head into a heat trap of the worst possible description. Increase in engine speed accentuates the temperature differences between the two sides of the head, which effect is increased by caps preventing water cooling thereof. The only points favoring this engine in practice are (a) mechanical reliability owing to low engine speed and (b) quick warming up as a consequence of in efficient cooling and bad scavenging. Limitations in work of expansion and waste of fuel combine to make the original T-head engine one of the most inefficient among four-stroke engines.

An engine having a head similar to that mentioned was fitted with spark plugs over both inlet and exhaust valves. In addition, a larger carburetor was fitted and the com-

(Continued on Page 19)

Table 1—Principal Pre-War and Post-War British Combustion-Chamber Types

Form	Constructional Reason	Controlling Characteristics
	PRE-WAR TYPES	
T-Head	Simplicity	Separation of intake and exhaust
L-Head	Cheapness in production	Juxtaposition of intake and exhaust
	POST-WAR TYPES	
Ricardo	Thermal efficiency	Reduction of cooling area and internal resistance
Overhead Valve	Power	Increased pumping capacity
Whatmough	Efficiency, power and mooth burning	Streamlike flows of intake and flame

Whatmough's Paper on Combustion Discussed by Janeway and Taub

PREPARED discussion of the paper on "Combustion Chamber Design in Theory and Practice," and presented by W. A. Whatmough, consulting engineer, of Twickenham, England, at the summer meeting of the Society of Automotive Engineers today, is presented in part herewith.

The discussion represents the views of two American engineers, R. N. Janeway, consulting engineer, Detroit, and Alex Taub of the Chevrolet Motor Company, on the problem discoursed upon by Mr. Whatmough. Taken together, the views of the three men contain much illuminating information on the development of high-compression engines.

By R. N. JANEWAY

WE ARE greatly indebted to Mr. Whatmough for a comprehensive picture of the state of the art of combustion-chamber design in England and of his own contribution to its improvement.

To my mind, the outstanding feature of Mr. Whatmough's paper is the proof of the astounding backwardness of the art of combustion-chamber design as currently practiced by engine designers in England. This is all the more surprising when it is considered that English scientific workers, such as Clerk, Dixon and Hopkinson pioneered in the study of engine combustion.

Plug Location Important

There is no question that Mr. Whatmough's work, in its practical form, is in the right direction and must represent a very marked improvement over existing English practice as illustrated in his paper. However, when compared with current American practice, Mr. Whatmough's design, as illustrated in his paper, represents an improvement only in connection with spark-plug location. His location of the plug over the exhaust valve and at the extreme end of the chamber is decidedly to be preferred to the current American practice of favoring the inlet valve and leaning toward the center of volume of the chamber.

In the combustion-chamber contour itself Mr. Whatmough's typical designs are very closely the same as the so-called modified Ricardo type which is practically standard practice in this country today. The considerably higher level of compression which Mr. Whatmough claims for his designs over that of very similar designs in this country must be due in great measure, in general, to higher quality of British fuel and generally smaller cylinder size of the British engines. For these reasons the American 5¼ to 1 compression ratio is probably equivalent on an average to the 6 to 1 permissible in English practice.

Fuel Cooling Essential

There is only one corrective for detonation, namely, to prevent the attainment of the critical temperature by the unburned gas either by cooling this gas as it is compressed, or by raising the critical temperature by modifying the characteristic of the fuel mixture. The only recourse in attacking detonation through combustion-chamber design thus boils down to the provision of the highest possible cooling effect upon that part of the unburned gas which is last to burn. Mr. Whatmough attaches great signifcance to the temperature of the exhaust valve as a factor in detonation. This can be true only when the spark-plug is so located that the exhaust valve is at a point most remote from the plug. Only then can the exhaust valve form a detonative heat trap since that is the only condition under which the gas surrounding the valve will be the last to burn and hence subject to detonation.

From the illustrations given in

(Continued on page 10)

By ALEX TAUB

UP to the current paper by N. A. Whatmough, with the exception of Janeway, S. A. E. Journal May, 1929, writers on combustion chambers have dealt with knock suppression only.

Ricardo has vaguely hinted at smoothness control by virtue of a means for controlling turbulence. That is, turbulence in the Ricardo sense, that has to do with the agitation of the mixture both before and after firing. The greater the turbulence, the more rapid combustion proceeds. Just how Ricardo intends to increase or decrease this phenomenon locally within the combustion chamber, I do not know.

Janeway has divided the combustion fundamentals into two departments of endeavor: Knock control and shock control.

Janeway considers the temperature of the last gas to burn as the most important factor in detonation control. He warns us against the many ways that the temperature may be affected.

Janeway has offered us a mathematical mechanism for proportioning our combustion chambers along anti-shock lines. His principle lies in volume control, that is, controlling the volume progressively burned. It is entirely up to his fellow physicists to determine the validity of this mechanism. However, it is not difficult to believe that if the volume burnt increases more rapidly in one chamber than in another, that there will be a noticeable difference in the characteristics of combustion.

Of course, under the Janeway theory, the spark plug location is just as important as the chamber shape.

Now we have a third method of combustion control for anti-shock operation. Whatmough uses local variation in temperature throughout the unburnt mixture to obtain

(Continued on Page 7)

Taub Analyzes Whatmough Theories on Combustion

(Continued from Page 6)

control. The higher the temperature, the more rapid the burn. The cooler portions of the chamber having a quenching effect. We know that with a cold engine combustion is retarded to such an extent that the engine will spit, but just how much local difference can affect combustion after the performance is stabilized is another question.

There is a remarkable similarity in the Whatmough and Janeway final result, even though their theories differ widely. Both recommend firing from hot into cold. We have fired from the exhaust valve for anti-detonation since 1923, as have many others. Both use the clearance space, at least it is a part of their general design. Both indicate chambers that are relatively non-compact, and have diminishing volume as the burn progresses.

Whatmough and Janeway recommend avoiding restricting throats between valve pocket and cylinder bore. Our own practice has been to maintain this throat area from one and one-half to twice the effective valve opening.

Whatmough has added the stream line around both valves for better filling and less heat build up in the exhaust valve. Undoubtedly these are valuable adjuncts to high speed engine operation, although doubtful where larger restricted range engines are being used.

Our most recent work has been carried out by following the Janeway principle of volume control. However, usually where the volume is locally reduced the surface to volume ratio is increased, which, of course, would mean somewhat lower temperature.

Mr. Whatmough, although advocating a means for lowering exhaust valve temperature, yet lauds the hot exhaust as a virtue in poppet valve engine over Knight engine. He credits the poor economy of the sleeve valve engine while warming up to the lack of a hot spot, or exhaust valve. I believe that mechanical friction due to engine construction with cold oil to be the primary factor.

We know that this type of engine, which is minus the hot exhaust valve, is prone to excessive knock. We believe that it is due to the fact that the surface to volume ratio for the last gas to burn is low or there is no equivalent of the clearance space.

With regard to loading one side of the piston as a producer of roughness, to that we can hardly subscribe, since the pressure must be uniform throughout, and the piston is moving away from the combustion chamber when the charge is half burned.

Is the combustion chamber shown as a recent design which was later modified by Whatmough, typical of present English combustion chambers? If so, then I believe that the typical practice in the United States is far ahead. We believe that almost any change would improve this head.

It appears that in each case of improvement by Whatmough the chamber was made less compact and the plug position improved. It must be remembered that the engines used by Mr. Whatmough are smaller than engines used in this country. I doubt whether Mr. Whatmough would recommend 6 to 1 for real smooth operation on a relatively large engine.

Mr. Whatmough has emphasized the necessity of perfect distribution to obtain an optimum result. With this we can readily agree. We have an interesting side light on the business of distribution and detonation.

During test work on the desert roads of Arizona last August, with air temperatures around 116 degrees Farhenheit to 120 degrees Farhenheit, we were using a set up which included an engine with very good distribution. Our full load economy was .54 pound per brake horse power hour. The carburetor setting was set to take advantage of this lean operating possibility. The result was imposible from a detonating and general cooling standpoint. The carburetor was changed to a normal or .70 pound per brake horse power hour setting. This eliminated any serious detonation, and we had no trouble in general cooling.

The over all economy on the road was not affected since full load economy had no effect on road work. The fuel consumption for each carburetor setting for a 3,000 mile trip was practically alike. I believe distribution is most important for part throttle running for lowering fuel consumption and important for wide open work for the sake of uniformity, but in the latter case the richest mixture consistent with common sense should be used.

Mr. Whatmough states that to obtain the best results with his system of procedure, exactness is the essence. He states that variation of the gasket either way from ideal will mean a loss. Does this mean that only a specialist, fully conversant with his methods, can hope to use his material successfully

Every engineering organization at times prefers to carry on independent experments to satsfy themselves.

Has Mr. Whatmough a definite procedure for proportioning combustion chambers, if so, is he in position to explain it?

TRUCK TERMINAL OPENS IN PORTLAND, OREGON

Portland, Ore., June 26.—A new automobile freight depot, known as the Portland Truck Terminal has just been opened in Portland in the block bounded by 9th, 10th, Irving and Johnson Streets. Twenty-five firms with approximately 100 trucks are operating from there, announces the F-D Equipment Company of of the firm.

S. A. E. Technical Program for Summer Meeting

THURSDAY, JUNE 27

Transportation Session

9:30 A. M.—Casino

H. F. FRITCH, Chairman

Long Distance Bus Transportation—R. E. Plimpton, Associate Editor, Bus Transportation.

The Science of Business Applied to Motor Truck Operation—Nathaniel Mallouf, President, Mallouf Haulage and Maintenance Company.

Mixture-Distribution Conference

9:30 A. M.—Lounge

O. C. BERRY, Chairman

Discussion by H. W. Best, Sheffield Scientific School; C. S. Kegerreis, Tillotson Manufacturing Company; J. B. Macauley, Chrysler Motors; P. S. Tice, Stewart-Warner Speedometer Corporation; C. L. Petze, Massachusetts Institute of Technology; G. M. Bicknell, Carter Carbureter Corporation; C. F. Taylor, Massachusetts Institute of Technology; E. S. Marks, H. H. Franklin Manufacturing Company; W. P. Deppe, Deppe Motors Corporation; E. D. Herrick, Lycoming Manufacturing Company; D. P. Barnard, 4th, Standard Oil Company, and Capt. W. C. Thee, Massachusetts Institute of Technology.

Airship Session

8:30 P. M.—Casino

E. P. WARNER, Chairman

Airship Transportation—V. R. Jacobs, Assistant Manager, Aeronautic Department, Goodyear Tire and Rubber Company.

* * *

Truck Combustion And Design Feature S. A. E. Convention

(Continued from Page 1)

automobile itself but also toward the improvement of highways, and that within the next few years automobiles capable of sustained speeds of 100 miles an hour would be developed and highways suitable for such speeds with safety would be available.

The engineer's job, he pointed out, is to continue his efforts toward . reducing . transportation costs, transportation hazards and transportation inconvenience and toward increasing transportation speed transportation safety and transportation comfort through improved cars, improved highways and increased research.

Elizabeth, N. J., June 26.—Members of the Elizabeth Auto Trade Association at their luncheon meeting in Winfield Scott Hotel, decided to have a fishing trip to Tuckerton on July 9. Cecil Hersh, Newton A. Barnett, J. C. Cressman and George F. Ludeking were appointed by the president, John D. Zolzer, as a committee of arrangements.

SUPERIOR MANUFACTURING

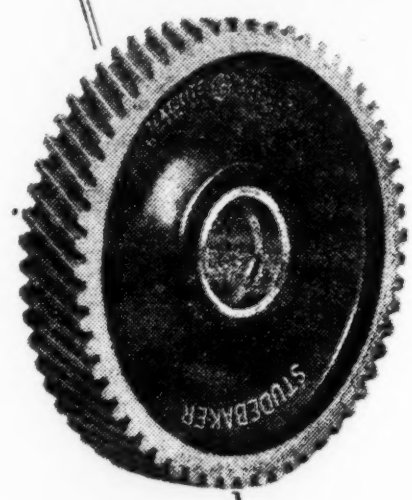
GENERAL ELECTRIC pioneered the development of silent timing gears and built so well that to-day practically all timing gears made are patterned after the basic General Electric design.

The strength and life of any non-metallic gear depend upon the fabric used as its base. Standard army duck is not considered good enough by the General Electric Company, which pays a high premium for a 15½-ounce canvas especially woven to rigid specifications for its exclusive use. The twisted, long-fiber threads and the tighter weave of this fabric produce a denser, stronger, tougher material.

With all precautions taken to insure the best base material, General Electric then bonds it with a synthetic resin which thorough tests have proved to be the best on the market.

There is no compromise with accuracy in a good gear drive—it is a token of good manufacture throughout the car.

TEXTOLITE TIMING GEARS



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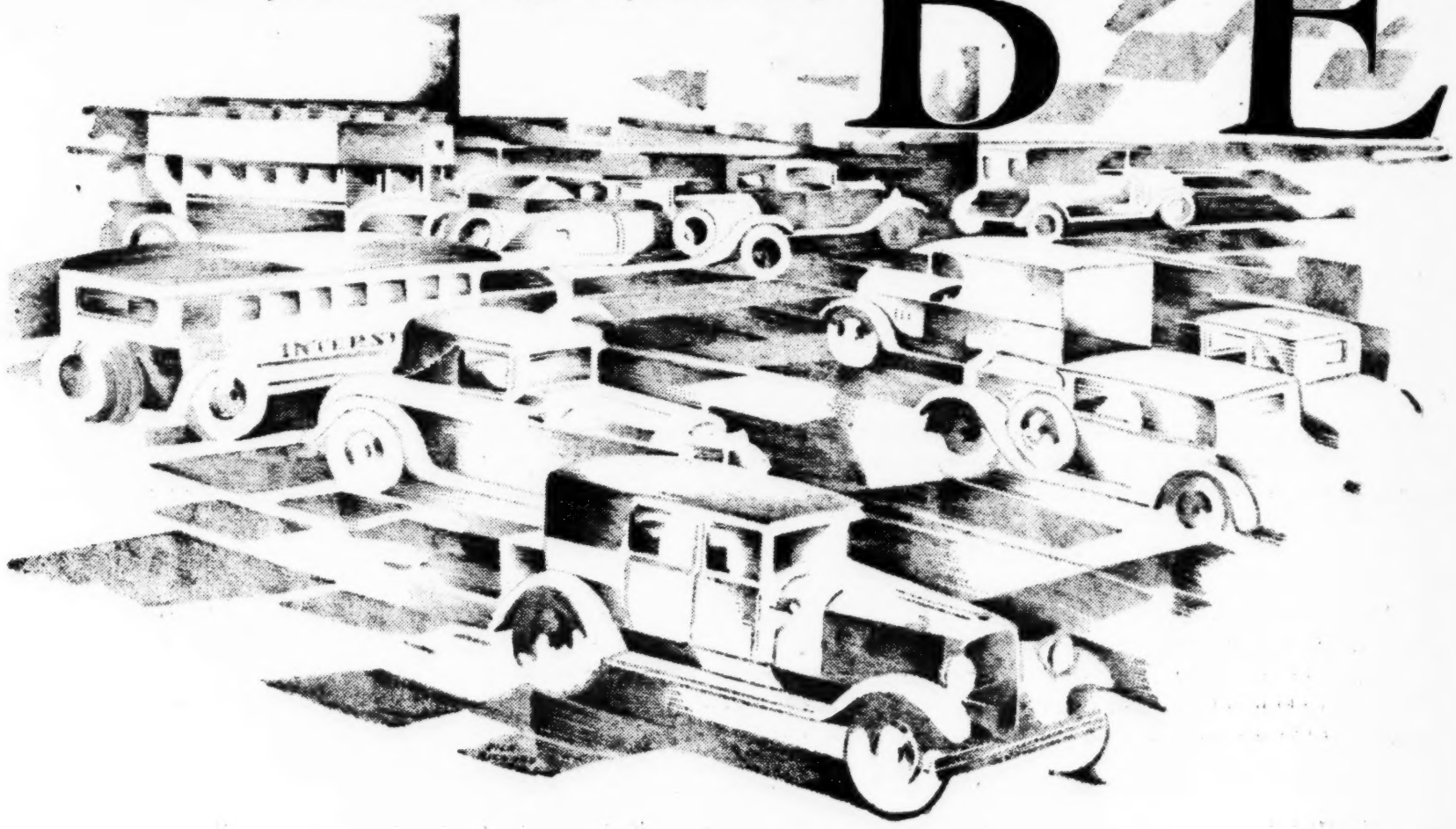
B-E



BENDIX

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BENDIX SERVICE CORPORATION, CHICAGO—NATIONAL SERVICE FOR BENDIX PRODUCTS
BENDIX-COWDREY BRAKE TESTER, INC., FITCHBURG, MASS.—BRAKE SERVICE EQUIPMENT
ECLIPSE MACHINE COMPANY, ELMIRA, NEW YORK—BENDIX STARTER DRIVE
DELCO AVIATION CORPORATION, DAYTON, OHIO—ELECTRICAL EQUIPMENT FOR AVIATION
ECLIPSE AVIATION COMPANY, EAST ORANGE, N. J.—AVIATION STARTERS AND GENERATORS
ECLIPSE TEXTILE DEVICES, INC., ELMIRA, N. Y.—TEXTILE DEVICES AND DYEING PROCESSES
INTERNATIONAL GERNANDT MOTORS, LTD., SOUTH BEND, IND.—AUTOMOTIVE DIESEL ENGINES
SCINTILLA MAGNETO COMPANY, SIDNEY, N. Y.—MAGNETOS FOR AIRPLANES
STROMBERG MOTOR DEVICES COMPANY, CHICAGO—AVIATION AND AUTOMOTIVE CARBURETORS
STROMBERG RESEARCH CORPORATION, CHICAGO—AUTOMOTIVE AND AVIATION DEVELOPMENT

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R. N. Janeway Discusses Paper by W. A. Whatmough

(Continued from Page 6)

Mr. Whatmough's paper, I can see how this condition may occur in actual engines, but if it were not for these illustrations I would have difficulty in believing that any one could so design an engine and still be allowed to practice his nefarious trade. Certainly I know of no such horrible example in American engine design even at its worst. The exhaust valve can, of course, affect the temperature of the incoming charge to some extent and in that way may prove to be a minor factor in detonation. However, in this respect Mr. Whatmough claims the exhaust valve performs an important function although I am inclined to discount either the desirability or the necessity for promoting this function of the valve.

Offsetting Important

The provision of a highly cooled pocket over the piston which is achieved by the offsetting of the combustion chamber is the most most important and at the same time the least recognized single factor in the anti-knock effect of the combustion chamber. This feature, which dates back a great many years in the art, owes its origin entirely to accident, or perhaps, to the workings of a bountiful Providence. The various reasons for its inclusion in early designs and even in Ricardo's designs, need not be gone into here; suffice it to say that they were all wrong reasons for doing the right thing. Mr. Whatmough falls into the same error, for which there is at least good precedent, by denying any merit to the effect of the clearance space. He furthermore subscribes to the fallacious idea originally advanced by Ricardo that the flame is quenched due to the high cooling effect of the clearance space and, therefore, that the gas included in this space does not burn completely. Ricardo adds that for this reason also this gas cannot detonate.

If the quenching hypothesis were correct, this would, of course, be true, however, the facts are not only that this gas burns normally, but that it also may detonate. Mr. Whatmough considers the fact that an engine knocks in spite of the cooling effect of the clearance space sufficient evidence that the latter has no anti-knock effect. He forgets, however, that like everything else, degree of detonation is relative and that if detonation occurs in spite of the high cooling effect of the clearance space that detonation would be tremendously greater if that cooling effect were absent. The proof that the gas in the clearance space burns normally lies in the fact that the quantity of gas involved is too great for this alleged quenching to take place without seriously impairing the engine's efficiency, since not only is the volume in the clearance space considerably increased by piston movement before the flame reaches it, but a very considerable amount of the charge is forced into the space as the pressure increases during combustion in the main chamber. The weight of unburned charge in the clearance space varies during combustion. In a representative case which assumes 50 per cent. of the piston covered the top center clearance of one-sixth of an inch. When the flame reaches the clearance space the weight of gas in the space amounts to 19 per cent. of the total charge. The fact that offsetting even to an extreme degree does not involve any loss in efficiency proves conclusively that this gas must burn normally and completely.

Furthermore, since the percentage of the total charge which takes part in detonation is of the order of 10 per cent. at a maximum under ordinary conditions, it is also evident that detonation, if it takes place, must occur in the clearance space when this gas is the last to burn. It is important to bring out the fact that detonation can always be induced, no matter how great relatively is the cooling effect upon the unburned gas if the maximum pressure is raised high enough either by increase in compression ratio or by excessive spark advance. It is noteworthy in this connection, that in spite of the fact that Mr. Whatmough discounts any effect of the clearance space, all of his designs, as illustrated in his paper, include a clearance space, either by intention or by accident. I do not hesitate to say that without this clearance space not one of Mr. Whatmough's designs would have produced the excellent results, which they undoubtedly have, in the way of high permissible compression.

Question Turbulence

In Mr. Whatmough's mention of turbulence he defines this term as being agitation produced during the compression stroke. This is a surprising statement in the face of the fact that in all internal-combustion engines, turbulence is primarily produced by the relatively high velocity of the incoming charge, and furthermore, that without this turbulence efficient high-speed operation would be impossible because of the slowness of combustion.

In referring to his designs as being anti-turbulent, Mr. Whatmough apparently loses sight of this fundamental turbulence in his pre-occupation with so-called turbulence production on compression. Mr. Whatmough goes on to explain that turbulence speeds up the burn by increasing the heat transfer from the walls to the unburned gas. While turbulence is a very potent agency in combustion it is difficult to understand how even turbulence can reverse the natural tendency for heat to flow from the unburned gas to the walls since the mean temperature of the unburned gas is considerably greater during compression and combustion than that of the walls with which it contacts. In this way he blames turbulence for tending to increase detonation. How, then, does he account for the marked tendency for detonation to decrease as the engine speed is increased in spite of the fact that turbulence and, consequently, flame speed, are at the same time tremendously increased.

The truth is that this tendency of detonation to decrease with increase in speed occurs not in spite of turbulence but because of turbulence. Experimental evidence in proof of this has previously been presented by myself. The explanation for the effect of turbulence in reducing detonation lies in the fundamental influence of turbulence in promoting heat transfer, in this case intensifying the natural tendency for heat to flow from the unburned gas to the cooler walls of the chamber during combustion. This effect of turbulence is twofold since not only is the turbulence itself directly effective, but by increasing the flame velocity it also increases the rate of displacement of the unburned gas ahead of the flame and thus creates velocities of flow of the unburned gas which promote its cooling in contact with the walls of the chamber. This combined effect is great enough to overcome the tendency of reduced explosion time to increase detonation by reducing the total heat transfer. It is important in this connection to emphasize the fact that no clean cut evidence exists to bear out the many claims made for turbulence induced on the compression stroke. The fact is that turbulence is primarily dependent on the intake velocity through the valve and this velocity is not again approached at any time after the gas has entered the cylinder.

In reality the flow induced on the compression stroke is opposite in direction to that induced on the suction stroke so that the tendency may really be to damp out the initial turbulence rather than to intensify it. In the face of these facts the case cited by Mr. Whatmough in which an increase of 22 per cent. in the transfer area between the cylinder and the chamber resulted in a permissible increase of two whole compression ratios is hard to take seriously. Apparently, however, this is a question of interpretation rather than of fact.

Asks Spark Data

Mr. Whatmough makes his deduction by comparing the actual increase in critical spark advance with that which he calculates would be accounted for by the reduction of nine-tenths of a compression ratio. It is to be regretted that Mr. Whatmough omitted this interesting calculation from his paper because I am sure that it would be a highly valuable contribution to the subject. My own impression, from examination of the curves presented in this case, is that the increase in critical spark advance is due entirely to the reduction in detonating tendency produced by the decrease in compression ratio. The characteristic of the spark advance curve in the case of the higher compression is typical of an over-compressed engine, that is, the spark advance for incipient detonation remaining practically constant as the speed increases until the torque begins to drop off sharply when the permissible spark advance increases abruptly. With the reduced compression, the appearance of the spark-advance characteristic is normal.

Coming to the subject of smoothness, as affected by the combustion characteristic, again I am forced to plead complete disagreement with Mr. Whatmough's explanation. He maintains that smoothness is governed entirely by the direction in which the flame is made to travel, that is, that firing from a hot zone into successively cooler zones makes for smoothness by reducing the flame velocity and vice versa. While there is an element of truth in this contention, Mr. Whatmough's reasoning here is dimensionally inaccurate.

Since the shock tendency of combustion is determined by variations in the rate of pressure rise, the fundamental factor involved is necessarily the mass rate of burning. This is obviously a function not only of flame velocity, but of flame front area and charge density. To make the flame velocity alone responsible for the shock or roughness tendency is comparable to determining the volume of a body of variable cross-section by means of its length alone. The contour of the chamber with respect to the location of the plug is the determining factor in the variation in flame front area and hence in the volume rate of burning. By taking into consideration the variation in flame velocity and charge density, as combustion proceeds, the volume of the charge can be so distributed in the chamber with respect to the spark plug, as to give a predetermined pressure-time characteristic for maximum smoothness.

This fundamental of volume distribution must be depended upon to obtain smoothness. In a general way it becomes evident from this analysis that reduction in chamber compactness will tend to improve smoothness since the volume rate of burning in any flame front position must necessarily be reduced. Likewise any increase in the total length of flame travel brought about by plug location will tend to improve smoothness by increasing the total burning time.

Chamber Design Important

It is interesting to interpret Mr. Whatmough's results as presented in his paper on this basis. It should be noted that in every case Mr. Whatmough started from a chamber of extreme compactness and modified the design by considerably reducing the chamber compactness and be very considerably increasing the length of flame travel. The combined effect of these two changes must inevitably have made a marked improvement in smoothness.

Just as in every case cited by Mr. Whatmough, the combustion-chamber was originally of inherently rough design, so was it also of inherently poor anti-knock design, especially with regard to spark-plug position. In many cases the plug was so located as actually to make possible the pocketing of the last gas to burn around the exhaust valve, which is certainly the most aggravated possible knock-inducing condition. In addition to the improvement in detonating tendency necessarily made by the change to a plug location over the exhaust valve, the reduction in the degree of offsetting is responsible for still further improvement. Experimental evidence abounds which bears out the contention that the change from extreme degree of offsetting to a moderate degree will invariably produce a considerable improvement in anti-knock effect.

There is one more point which Mr. Whatmough brings out which I have found puzzling. Mr. Whatmough refers several times to the roughness produced by flame thrust on one side of the piston in the case of the so-called turbulent type of chamber. I, for one, find difficulty in visualizing this condition. Does Mr. Whatmough conceive of the flame as being equivalent to a projectile? My own impression would be that the natural tendency for pressure equilibrium to be maintained, at least during normal combustion, would produce uniform pressure upon the piston even in the case of extreme offsetting with minimum clearance between the piston and head.

Whatmough Presents Paper On Combustion Chambers

(Continued from Page 6)

pression ratio raised to 4.75 to 1. The increase in horse power was considerable. Dual ignition with firing over the exhaust valve thus permits the use of a high compression ratio and a fuller use of the pumping capacity of the engine. The raising of the useful compression ratio is testimony from a combustion-chamber head possessing inherent knock characteristics of the anti-knock virtue of directional firing; that is, clearing combustible from the exhaust valve pocket before a detonative pressure rise is attained.

The saving of a cam shaft, as compared with the T-head engine, was the original reason for the introduction of the L-head or side-by-side-valve engine. Its popularity as a production engine arises from both relative cheapness in manufacture and quietness in running after much service. The juxtaposition of the inlet and exhaust valves in the same lateral valve capacity constitutes an advance in combustion chamber design, which up to the present has hardly been appreciated. The cooling of the inlet valve and the heating of the exhaust valve counteract each other to a certain extent, which materially lessens fuel waste and increases permissible engine efficiency.

More experimenting has been done upon engines with side-by-side valves than upon all other types of cylinder heads combined, and the antiknock theory of combustion-chamber design revolves around results obtained from various forms of L-head engine. The original L-head consisted of a combustion chamber of even depth extending over the cylinder barrel and over a lateral valve cavity. The valve cavity is on one side of the cylinder only, so the chamber is a little deeper and has less surface than the T-head of corresponding compression ratio.

Engines of modern design may still embody the essential features of the original L-head. The development consists of several stages, one of which is definitely retrograde. For classification purposes these heads can be designated as

(1) Retrograde or restricted L-heads.
(2) Improved L-heads
  (a) Sloping-roof L-heads
  (b) L-heads with inclined valve cavity
  (c) Turbulent heads
  (d) Semi-turbulent L-heads
  (e) Streamlined or anti-turbulent L-heads

Overhead-Valve Engines

The valve-in-head engine has had a long vogue in America as a high-speed engine because it can give considerably greater efficiency than the less costly L-head engine. Motor car taxation in the British Isles is based upon cylinder bore, and post-war taxation made manufacturers of automobiles concentrate their efforts upon more power output per taxed horsepower by increasing the engine speeds and using higher compression-ratios. Engines with push-rod operated valves along the center line of a detachable head with overhead valves became the mode for medium price automobiles until very recently, when the need for quiet valve-operation has led to improved L-heads regaining lost ground.

The compact combustion-chamber of overhead-valve I-head engines should be almost fool-proof according to theory, yet it disappoints in practice. Whenever plentitude of power is obtained on the test bench, the resultant automobile is a noisy sport car instead of the fast flexible speed type. The close juxtaposition of cool inlet and hot exhaust disturbs the working heat-balance. Whenever the head is sufficiently cooled to prevent autoignition and engine knock, the engine runs unevenly because it is overcooled from a combustion point of view. Conversely, when the walls of the cylinder-head are hot enough to assure absence of flame quenching and fuel deposition at low engine-speed, the mixture burns too fast, hence the engine becomes rough at high speeds and pinks on load unless doped fuel is used.

Flexibility is secured by sacrificing volumetric efficency, small-bore pipes being used along with intensive exhaust heating at sharp bends. The consequence is that the pumping capacity of automobile engines with overhead in-line valves seldom approaches realizable efficency. However, one British small-bore six-cylinder engine develops 28 hp. per liter (0.46 hp. per cu. in.) at 4,500 r.p.m. Designs have been made of three distinct types of I-heads embodying Whatmough principles that smooth combustion and overcome induction limitations upon flexibilty. I am not at liberty to give any details except that the first engine completed is definitely anti-knock, despite excellent power output.

Hemispherical combustion chamber heads are popular with British automobile manufacturers specializing on high-speed cars. Unfortunately, as already explained, compact heads are subject to over-cooling and over-heating troubles, and ultra-high speeds only accentuate these drawbacks. Bad burning, due to the rich carburetor settings for rapid acceleration, make sport automobiles run well only at high rates of revolution. The driver attains and maintains a high average road speed by much gear changing.

Is ETHYL good for ANY CAR?

ETHYL Gasoline was developed to make engines of higher compression commercially practicable. Engines of this type require Ethyl if they are to give their best performance. But Ethyl fluid, the basis of Ethyl Gasoline and whose active ingredient is tetraethyl lead, makes any gasoline a better fuel for any engine.

In cars of average compression Ethyl brings out an additional power which ordinary gasoline cannot be expected to obtain. It speeds up pick-up, reduces gear shifting, creates a new standard of motoring comfort and efficiency.

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Free Import of Tractors Arouses Controversy

(Continued from Page 1)

removed in the new tariff as proposed by Senator Reed.

As the National Automobile Chamber of Commerce, so far as is known here, has taken no position in the issue thus far, it also is not known what prompted the suggestion of Senator Reed, a powerful member of the Senate Finance Committee.

However, it is understood that some time ago President Hoover requested a prominent automobile manufacturer to sound out the industry as to its attitude on the tariff. However, no conclusion was reported to the President, it its understood.

It is conceded that European plants cannot compete with American plants at neutral markets at present and there is no immediate question of European competition in the American market.

In other words, it is believed that while the American automotive industry is seeking to force reduction of foreign tariffs, it is perfectly willing to protect American labor and does not feel that admission free of foreign cars would be of any sufficient quantity to affect America's high wage scales.

President Butterworth of the United State Chamber of Commerce, of which the National Automobile Chamber of Commerce is a member in his statement, in part, says:—

"American industry has made an honorable record, operating on higher wage scales and shorter hours by intensive application to organization. It has, moreover, shown a willingness to venture capital in equipping industry with the most efficient machinery inventive genius can devise, and a great devotion and unflagging energy in the prosecution of business.

"These factors have resulted in lower production and selling costs than would otherwise have been possible with America's higher wages. American industry, including agriculture, has a right to ask that these advances be protected against destructive competition from abroad, and it desires no more than this.

"In applying the principle of protection with the constant changes throughout the world in costs of raw materials, wages, transportation costs and other factors, the chamber has long supported the principle of flexible adjustments of tariff schedules to correct manifest inequalities and inadequacies.

"It again repeats its conviction that, within legislative limits fixed by Congress, this flexibility should be maintained and improved in administration so that it may exercise a quickly applied corrective influence.

"Furthermore, if American exports encounter discriminations abroad, we believe there should be adequate means in our law to cope with them. We, likewise, favor provisions to meet foreign discriminations—if encountered—in relation to essential materials which we can obtain only from abroad.

"We favor permissive legislation for the creation in American ports of trade zones into which foreign goods and commodities may be shipped for manufacture, repacking and other necessary handling for shipment to foreign destinations without the expense and delay incident to passage through the American customs."

Financial News

General Spring Bumper Stock Is Deposited

Detroit, June 26.—Deposits of General Spring Bumper Corporation capital stock under the plan and agreement which proposes combining the businesses of Houdaille-Hershey Corporation and Genera Spring Bumper Corporation now total enough to insure the success of the plan, according to C. L Barnes, president of both companies.

Stockholders of General Spring Bumper Corporation will receive in exchange for their shares capital stock of Houdaille-Hershey Corporation on the basis of one share of Houdaille-Hershey Class A for each share of General Spring Bumper Class A and one share of Houdaille-Hershey Class B for each share of General Spring Bumper Class B.

WINTON ENGINE CO. EARNS $300,300 IN FIVE MONTHS

New York, June 26.—Net profit of Winton Engine Company for five months ended May 31, 1929, was $300,300 after interest, depreciation and taxes, equivalent after allowing for dividend requirements on the preference stock, to $4.04 a share on 65,000 no-par shares of common stock.

May net profit was $81,925 after depreciation, interest and taxes.

GARDNER WILL INCREASE CAPITAL TO 500,000 SHARES

New York, June 26.—The Gardner Motor Company, Inc., has notified New York Stock Exchange of proposed increase in authorized capital to 500,000 shares, from 300,000.

DAILY AVERAGE OIL OUTPUT SHOWS GAIN

New York, June 26.—The American Petroleum Institute estimates that the daily average gross crude production in the United States, for the week ended June 22, was 2,764,500 barrels, as compared with 2,743,250 barrels for the preceding week, an increase of 21,250 barrels. The daily average production east of California was 1,929,000 barrels, as compared with 1,927,950 barrels, an increase of 1,050 barrels. The following estimates of daily average gross production, by districts, are for the weeks ended June 22, 1929, June 15, 1929, and June 23, 1928.

Imports of petroleum (crude and refined oils) at the principal United States ports for the week ended June 22 totaled 1,460,000 barrels, a daily average of 208,571 barrels, compared with 2,434,000 barrels, a daily average of 347,714 barrels for the week ended June 15, and a daily average of 271,714 barrels for the four weeks ended June 22.

SILVER FLEET SCROLL HAS MANY PROMINENT NAMES

Los Angeles, Cal., June 26.—As a record of more than 400 receptions during the western-bound transcontinental tour of the Goodrich Silver Fleet, the scroll containing names of more than 400 civic and political personages is an epochal and most cosmopolitan document.

Mayor Jimmie Walker of New York affixed his signature after christening the flagship of the fleet on January 23. From that day a variety of penmanships was added to the pages of the goodwill greeting to Mayor Cryer, and this city was greeted by more than 400 local and nationally prominent persons when the gypsy caravan ended the first span of its unique tour here.

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Hidden, unseen, North East Electrical Equipment is serving car owners the world over—serving so unfailingly that most of them don't even know where the various parts are located. They simply depend on the rugged sturdiness hidden within North East. They've learned that they can.

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North East Electric Co., of Canada, Ltd., Toronto

Societe Anonyme Francaise North East, Paris, France

North East Electric Co., Ltd., London, England

Through a world-wide organization of more than 1900 Authorized Service Stations, factory-supervised service and Genuine North East Parts are available wherever motor cars go. These facilities, though seldom needed, are—like North East Equipment—always at your service.

NORTH EAST SERVICE AUTHORIZED STATION

NORTH EAST ELECTRIC CO. ··Founded 1909·· ROCHESTER, N.Y., U.S.A.

Metal Used in Car Building Gained 58,100 Tons in 1928

WASHINGTON, June 26.—Consumption of non-ferrous metals by the automotive industry in 1928 amounted to 227,500 tons, compared with 169,400 tons in 1927, according to American Bureau of Metal statistics, an increase of 58,100 tons.

In this total, copper, with consumption of 125,000 tons, exceeds all other metals. Aluminum has shown a large increase, due to the general use of aluminum alloys in pistons.

The following table compares consumption of the principal metals for the past five years:—

	1928	1927	1926	1925	1924
Copper	125,000	99,000	102,800	106,400	93,700
Zinc	31,500	22,200	21,300	21,200	18,700
Tin	20,000	15,600	16,000	15,000	12,400
Lead	17,000	12,000	16,700	12,800	10,700
Aluminum	34,000	20,600	24,300	31,100	23,600
Total	227,500	169,400	181,100	186,500	159,100

Estimates are based on reports of the use of several raw materials where the manufacturer starts with them in the form of ingots, bars, sheets, etc.; computation from the number of cars made and the quantity of the several metals entering each make of car, truck or tractor in all other instances, and a small allowance for the metals entering replacement parts.

Estimate for copper does not include what goes into the cars in electric generators. The estimate for lead does not include what goes upon them in the form of paint, nor in the form of storage batteries.

The quantity of lead in storage batteries used for automobiles is uncertain, but it is estimated at 210,000 of the 220,000 tons used in the manufacture of batteries in 1928. The larger part of the zinc that goes into automobile manufacture is a constituent of brass, but a part is used in die castings. The tin goes into automobiles as a constituent of bronze, solder and babbitt. Lead is used mainly in solder and bearing alloys. Aluminum is used as sheet metal and as a constituent of alloys.

PLANS NEW GARAGE

San Bernardino, Cal., June 26.—Construction is to start at once on a one-story garage and tire-storage building to cost approximately $60,000 for the Firestone Tire and Rubber Company.

AMERICAN CARBURETION FORMED TO TAKE OVER CARBURETOR CONTROL CO.

Milwaukee, Wis., June 26.—W. E. Duersten, vice-president of the American Carburetion Company, announced that the American Carburetion Company is now being formed to take over the Carburetor Control Company of Los Angeles. American Carburetion will have the same offices as Carburetor Control. Fred E. Keeler, president of the Lockheed Aircraft Company, director of the Detroit Aviation Company, and the largest individual stockholder of the Lockheed Brake Company, is president of the Carburetor Control Company and will be president of American Carburetion.

W. E. Duersten, associated with Mr. Keeler in several of his enterprises, will be vice-president and general manager of the American Carburetion Company. H. W. Hess is the chief engineer in charge of research and development and will also be a member of the board of directors. Ben Hunter of Los Angeles, of the Lockheed Aircraft Company and the Detroit Aircraft Company, will be a director.

The American Carburetion Company will manufacture a carburetor developed by the Carburetor Control Company through H. W. Hess.

PARAGUAY USING MORE AMERICAN-MADE VEHICLES

Washington, June 26.—Despite primitive road conditions in Paraguay, exports of automotive vehicles from the United States to that country last year numbered 264, of which 123 were passenger cars and 141 trucks, as compared with 147 units in the previous year, the Department of Commerce announced today. The American automobile dominates the Paraguayan market, all of the 1,500 vehicles registered as of January 1 last, with the exception of eighteen cars, being of American manufacture.

CURRENT PRICES OF PASSENGER CAR MODELS

AUBURN—6-80. 120 W. B.

4-dr. Spt. Sedan	995	Victoria	1,095
4-dr. Reg. Sed.	1,095	Cabriolet	1,095

AUBURN—8-90. 125 W. B.

4-dr. Sp. Sedan	1,395	Victoria	1,495
4-dr. Reg. Sed.	1,495	Cabriolet	1,495
Speedster	1,495	Phaeton Sedan	1,695

AUBURN—Series 120. 130 W. B.

5 4-dr. Sp. Sed.	1,795	Cabriolet	1,895
5 Sedan	1,895	Victoria	1,895
2 Speedster	1,895	Phaeton-Sedan	2,095

BLACKHAWK—6-cyl. 127½ W. B.

5 Coupe	2,275	5 Sedan	2,395
2 Speedster	2,535	4 Speedstr (TC)	2,735
2 Coupe	2,495	5 Wcy Chantilly	2,595
Cabrio. Coupe	2,595	4 Wcy Monaco	2,655
4 Speedster	2,535	4 Wcy Deauv'le	2,655

BLACKHAWK—8-cyl. 127½ W. B.

5 Coupe	2,275	5 Sedan	2,395
2 Speedster	2,535	4 Speedstr (TC)	2,735
2 Coupe	2,495	5 Wcy Chantilly	2,595
Cabrio. Coupe	2,595	4 Wcy Monaco	2,655
4 Speedster	2,535	4 Wcy Deauv'le	2,655

BUICK—Series 20. 116 W. B.

2 Bus. Coupe	1,195	5 Special Coupe	1,250
5 2-dr. Sedan	1,220	5 4-dr. Sedan	1,320
5 Phaeton	1,225		

BUICK—Series 40. 121 W. B.

2 Bus. Coupe	1,395	5 4-dr. C.C. Sed	1,450
4 Coupe	1,445	5 4-dr. Sedan	1,520
4 Spec. Coupe	1,450		

BUICK—Series 50. 129 W. B.

5 Spt. Phaeton	1,525	4 Con. Coupe	1,475
7 Touring	1,550	5 4-dr. Sedan	1,975
5 Coupe	1,465	7 Sedan	2,045
5 Cl. C. Sedan	1,875	7 Limousine	2,145

CADILLAC—Fisher Custom. 140 W. B.

2 Coupe	3,295	5 Coupe	3,595
2 Roadster	3,350	5 Sedan	3,695
7 Touring	3,450	7 Sedan	3,795
4 Phaeton	3,450	5 Imperial	3,395
5 Town Sedan	3,495	4 Spt. Phaeton	3,950
Conv. Coupe	3,595	7 Imperial	3,995

CADILLAC—Fleetwood. 140 W. B.

5 Sedan	4,195	Tr. Town Cab	
5 Sedan Cab.	4,195	(No. 3525)	5,500
7 Sedan	4,295	Tr. Town Cab.	5,500
5 Imperial	4,345	Tr. Lim. Brou.	5,500
5 Imp. Cabrio.	4,345	5 All Wr. Phae.	5,750
5 Club Cab.	4,395	5 All Weather	
7 Imperial Tr. Town Cab. (No. 3520)	4,545	Phae (Imp.)	5,995
			5,500

CHEVROLET—6-cyl. 107 W. B.

Phaeton	525	Sport Coupe	645
Roadster	525	Sedan	675
Coach	595	Imperial Sedan	695
Coupe	595		

CHRYSLER—6-cyl. 65.

Bus. Coupe	1,040	Touring	1,075
Roadster (RS)	1,065	4-dr. Sedan	1,145
2-dr. Sedan	1,065	Coupe (RS)	1,145

CHRYSLER—6-cyl. 75.

Royal Sedan	1,535	C. Coupe (RS)	1,795
Coupe (RS)	1,535	5 Phaeton	1,795
Roadstr (RS)	1,355	5 Phaeton	1,835
Coupe	1,655	7 Phaeton	1,865
Town Sedan	1,655	Con. Sedan	2,345
Crown Sedan	1,655		

CHRYSLER—"Imperial 80." 112 B. H. P.

Roadster	2,675	Con. Coupe	2,995
Cust. Roadster	2,895	7 Phaeton	3,095
Stan. Coupe	2,895	7 Sedan	3,095
5 Sedan	2,975	Sedan Lim.	3,475
Town Sedan	2,975		

CUNNINGHAM—8-cyl. 132 W. B.

Roadster	7,000	2 Coupe	8,000
4 Touring	7,000	4 Enclosed Dr.	
Sp. Spt. Roadsr.	7,750	Limousine	8,500
4 Special Speed Roadster	7,750	Petite Cabriolet	8,500

CUNNINGHAM—8-cyl. 142 W. B.

4 Touring	7,000	Town Car	8,500
7 Touring	7,000	Cabriolet	8,500
En. Dr. Lim.	8,500		

DE SOTO—6-cyl.

Easton	845	Cupe De Lujo	885
Roads'r Esmanol	845	Sedan	885
Business Coupe	845	Sedan De Lujo	955
Sedan Coche	845		

DODGE—Senior Six. 6-cyl. 120 W. B.

2-dr. Sedan	1,495	Roadster (RS)	1,565
4-dr. Sedan	1,545	4-dr. Lan. Sed.	1,595
2 Coupe (R. S.)	1,545		

DODGE—New Six. 6-cyl. 112 W. B.

Business Coupe	945	Phaeton	1,025
Roadster (RS)	995	DeL. Coupe (RS)	1,025
5 Brougham	995	4 Victoria	1,025
4-dr. Sedan	995	4-dr. DeL. Sed.	1,065

DURANT "40" 4-cyl.. 107 W. B.

2-dr. Sedan	625	Spt. Roadsr (RS)	595
Coupe	595	4-dr. Sedan	695

DURANT—"60." 6-cyl. 109 W. B.

Sp. Roadr (R.S.)	685	Cabriolet (R.S.)	750
Coupe	685	4-dr. Sedan	750
2-dr. Sedan	695		

DURANT—"66." 6-cyl. 112 W. B.
(Four Speed Transmission)

Coupe	895	4 dr. Sedan	975

DURANT—"70." 6-cyl. 119 W. B.
(Four Speed Transmission)

Coupe (RS)	1,195	4-dr. Sedan	1,285

ELCAR—"75." 117 W. B.

2 Roadster	995	Bus. Man's Cpe.	1,145
5 Touring	1,075	4 Coupe	1,165
5 Club Sedan	1,095	4 Con. Coupe	1,165
4 Roadster	1,145	5 Sedan	1,195

ELCAR—"95." 123 W. B.

2 Roadster	1,295	4 Con. Coupe	1,465
5 Club Sedan	1,395	4 Coupe	1,465
4 Roadster	1,435	5 Touring	1,495
Bus Man's Cpe.	1,445	5 Sedan	1,495

ELCAR—"96." 123 W. B.

4 Roadster (Fleetwing)	1,635	4 Con. Roadster	1,665
Bus. Man's Cpe.	1,645	5 Fleetwing Sed	1,695
4 Coupe	1,665	5 Prin. Sedan	1,895

ELCAR—"120." 127 W. B.

Bus. Man's Cpe.	2,245	4 Coupe	2,295
5 Sedan	2,465	4 Con. Roadster	2,295
5 Touring	2,465	5 Princess Sed.	2,295
4 Roadster	2,265	7 Sedan	2,645

ERSKINE—6-cyl. 109 W. B.

Club Sedan	860	4 Roy. Cabriolet	
2 Cabriolet	875	with ex. equip.	995
Standard Sedan	945	Roy. Sedan with extra equip.	1,045

ESSEX—6-cyl. 110½ W. B.

5 Coach	735	Speedster	850
2 Coupe	695	5 Town Sedan	850
5 Phaeton	735	2 Roadster	850
2 Coupe (R.S.)	725	2 Con. Coupe	895
5 Stand. Sedan	795		

FORD—Model A. 103½ W. B.

Roadster	450	Sport Coupe	550
Phaeton	460	Fordor Sedan	625
Pickup Op. Cab	445	Standard Sedan	650
Pickup Cl. Cab.	475	Cabriolet	670
Business Coupe	525	Town Sedan	695
Tudor Sedan	525	Town Car	1,400
Coupe	550		

FRANKLIN—130. 6-cyl. 130 W. B.

2-3 Coupe	2,160	5 Sedan	2,180

FRANKLIN—135. 6-cyl. 135 W. B.

5 Sedan	2,485	Vic. Brougham	2,595
2-3 Coupe	2,510	Con. Coupe	2,610
Oxford Sedan	2,535	Sport Sedan	2,625

FRANKLIN—137. 6-cyl. 137 W. B.

5 Touring	2,775	7 Touring	2,870
7 Sedan	2,715	Oxford Sedan	2,825
Spt. Runabout	2,785	Limousine	2,970

GARDNER—"120." 8-cyl. 120 W. B.

Sport Sedan	1,395	Coupe	1,495
Roadster	1,395	Sedan	1,595

GARDNER—"125." 8-cyl. 125 W. B.

Roadster	1,695	Victoria	1,895
Coupe	1,795	Sedan	1,895
Brougham	1,875	7 Sedan	2,195

GARDNER—"130." 8-cyl. 130 W. B.

Sport Sedan	1,995	Victoria	2,395
Roadster	2,195	Sedan	2,395
Coupe	2,295	7 Sedan	2,695
Brougham	2,375		

GRAHAM-PAIGE—"612." 6-cyl. 112 W. B.

5 2-dr. Sedan	855	5 Phaeton	970
5 4-dr. Sedan	955	2 Coupe (RS)	1,005
2 Coupe	955	Cabriolet (RS)	1,025
Roadster (RS)	970		

GRAHAM-PAIGE—"615." 6-cyl. 115 W. B.

5 2-dr. Sedan	1,155	2 Coupe (RS)	1,245
5 4-dr. Sedan	1,195	Cabriolet (RS)	1,295
2 Coupe	1,195	5 Phaeton	1,195
Roadster (RS)	1,195		

GRAHAM-PAIGE—"621." 6-cyl. 121 W. B.

5 Sedan	1,595	Roadster (RS)	1,795
4 Coupe	1,595	Cabriolet (RS)	1,810
2 Coupe (RS)	1,795	5 Phaeton	1,865

GRAHAM-PAIGE—"822." 8-cyl. 127 W. B.

5 Sedan	1,925	Roadster (RS)	2,125
4 Coupe	1,925	Cabriolet (RS)	2,145
2 Coupe (RS)	2,125	5 Phaeton	2,195

GRAHAM-PAIGE—"837." 8-cyl. 137 W. B.

7 Phaeton	2,195	5 Coupe (RS)	2,355
5 Sedan	2,355	7 Sedan	2,425
5 Town Sedan	2,355	7 Limousine	2,495

GRAHAM-PAIGE—"837." 8-cyl. 137 W. B.
(Custom Built Bodies)

7 Lim. Sedan	3,865	Limousine	4,430
Town Car	4,180		

HUDSON—6-cyl. 122½ W. B.

5 Coach	1,095	5 Town Sedan	1,375
5 Stan. Sedan	1,175	4 Con. Coupe	1,450
4 Coupe	1,195	5 Lan. Sedan	1,500
2 Roadster	1,250	5 Victoria	1,500
5 Phaeton	1,350		

HUDSON—6-cyl. 139 W. B.

5 Club Sedan	1,850	7 Limousine	2,100
7 Sedan	2,000		

HUPMOBILE—6-cyl. 114 W. B.
(Standard Models)

2-dr. Sedan	1,245	Roadster (RS)	1,390
4-dr. Sedan	1,350	5 Phaeton	1,410
4 Coupe	1,360	7 Phaeton	1,420
Cabriolet (RS)	1,385		

HUPMOBILE—8-cyl. 120 W. B.
(Standard Models)

Roadster (RS)	1,725	7 Phaeton	1,785
2-dr. Sedan	1,755	4-dr. Sedan	1,815
Cabriolet (RS)	1,755	7 Sedan (DeL)	2,345
4 Coupe	1,770	7 Lim (DeL)	2,475

JORDAN—"E." 6-cyl. 116 W. B.

Coupe	1,795	Sedan	1,795

JORDAN—"G." 8-cyl. 125 W. B.

Sedan	2,195	Playboy Roadr.	2,695
Coupe	2,195	Speedboy Phae.	2,695

KISSEL—White Eagle. Model 73

4-dr. Bro. Sed.	1,595	Sedan	1,695
All Year Coupe Rdstr (F.T.)	1,695	Coupe Roadster (Soli.l Top)	1,695

KISSEL—White Eagle. Model 95

4-dr. Br. Sed.	1,995	7 Touring	2,095
Sedan	2,095	Speedster	2,195
All Year Coupe (Solid Top)	2,095	Tourster	2,195
Rdstr. (F.T.)	2,095	A. Y. Broug.	2,595
Coupe Roadster		7 Sedan	2,595

KISSEL—White Eagle. Model 126

All Year Brou. Coupe Roadster (Solid Top)	3,185	4-dr. Brou. Sed	3,275
	3,185	Speedster	3,275
All Year Coupe Rdstr. (F.T.)	3,185	Tourster	3,275
		7 Sedan	3,795
		Berline Sedan	3,885

LA SALLE—Fisher. 8-cyl. 125 W. B.

4 Phaeton	2,295	4 Spt. Phaeton	2,375
2 Roadster	2,345		

LA SALLE—Fisher. 8-cyl. 134 W. B.

5 Family Sed	2,450	5 Cv. Lan. Cab.	2,725
2 Coupe	2,495	7 Sedan	2,775
Conv. Coupe	2,595	Imp. Town Sed	2,825
5 Sedan	2,595	7 Imperial	2,875
5 Coupe	2,625	Imo. Con. Lan	
5 Town Sedan	2,675	Cabriolet	2,875

LINCOLN—8-cyl. 136 W. B.

7 Spt. Touring	4,650	2 Win. Berline	5,800
4 Spt. Phaeton	4,650	3 Win. Berline	5,800
4 Coupe	4,800	Berline Landau	6,100
2 Club Roadstr	4,900	Limousine	6,200
2 Win. Town Sedan	4,900	Con. Coupe	6,500
		Open Dr. Tou.	6,600
3 Win. Town Sedan	4,900	Cabriolet	6,800
		Con. Sedan	6,900
5 Sedan	5,000	N. C. Cabriolet	7,100
4 Spt. Phaeton	5,050	All-Wea. Brou.	7,200
7 Sedan	5,100	Semi-Col. Cab.	7,350
Limousine	5,300	Cab. (Le Baron)	7,400
2 Coupe	5,200	Cab. (Brunn)	7,400

LOCOMOBILE—"86" 130 W. B.

5 Sedan	2,295		

LOCOMOBILE—"88." 140 W. B.

5 Cust. Sedan	2,650	7 Cust. Sur.	4,000
4 Con. Coupe	3,150	7 N. C. A. W.	
5 Phaeton	3,500	Cabriolet (CB)	7,500
7 Cust. Sedan	3,750		

LOCOMOBILE—"90." 138 W. B.

4 Roadster	5,900	7 N. C. Cabrio.	7,500
4 Sportiff	5,900	7 Suburban	7,500
7 Touring	6,000	7 Town Brough.	7,500
5 Vic. Sedan	7,300	7 S. C. Cabrio	7,750
7 A.W. Twn car	7,450		

LOCOMOBILE—"8." Custom. 142 W. B.

4 Sportiff	9,600	7 Town Brough.	12,500
7 Touring	9,600	7 Tour. Lim.	12,500
4 Roadster	11,000	7 E. D. Lim.	12,500
7 Cabriolet	12,500	5 Vic. Sedan	12,500

MARMON—8-cyl. 68. 114 W. B.

5 Sedan	1,465	2 Roadster	1,565
2 Coupe	1,465	2 Col. Coupe	1,565
4 Victoria	1,520	6 Speedster	1,625

MARMON—8-cyl. 78. 120 W. B.

5 Sedan	1,965	4 Victoria	2,065
2 Coupe	1,965	6 Speedster	2,065
2 Roadster	1,965	2 Col. Coupe	2,065

MARQUETTE—6-cyl. 114 W. B.

2dr. Sedan	975	2 Bus Coupe	965
Roadster (R.S.)	995	Special Coupe (R. S.)	995
5 Phaeton	995	4-dr. Sedan	1,075

NASH—Standard. 6-cyl. 112½ W. B.

2-dr. Sedan	885	4-dr. Sedan	955
Coupe	885	Cabriolet (R.S.)	955
Phaeton	935	4-dr. D. L. Sedan	995

NASH—Special Six. 6-cyl. 116 W. B.

Coupe	1,245	4-dr. Sedan	1,346
Phaeton	1,250	Cabriolet (RS)	1,345
2-dr. Sedan	1,260	Victoria	1,345
Coupe (RS)	1,315	Roadster (RS)	1,345

NASH—Special Six. 6-cyl. 122 W. B.

7 Sedan	1,645		

Nash—Advanced Six. 6-cyl. 121 W. B.

2-dr. Sedan	1,480	4-dr. Sedan	1,550

NASH—Advanced Six. 6-cyl. 130 W. B.

7 Phaeton	1,550	Ambas. Sedan	1,925
Cabriolet (RS)	1,660	7 Sedan	1,990
Coupe (RS)	1,775	7 Limousine	2,190

OAKLAND—6-cyl. 117 W. B.

Roadster	1,145	Standard Sedan	1,245
2 Coupe	1,145	Cabriolet	1,265
2-dr. Sedan	1,145	4 Spec. Sedan	1,320
Phaeton	1,145	5 Landaulet	1,375

OLDSMOBILE—Standard. 6-cyl. 113½ W.B.

2 Stand. Coupe	875	5 Phaeton	945
5 2-dr. Sedan	875	5 4-dr. Sedan	975
4 Spt. Coupe	945	5 Landau	1,035
4 Roadster	945		

OLDSMOBILE—Special. 6-cyl. 113½ W. B.

2 Stand. Coupe	950	5 Phaeton	1,020
5 2-dr. Sedan	950	5 4-dr. Sedan	1,050
4 Spt. Coupe	1,020	5 Landau	1,110
4 Roadster	1,020		

(Recent price changes in bold face)

OLDSMOBILE—De Luxe. 6-cyl. 113½ W. B.

2 Stand. Coupe	1,005	4 Spt. Coupe	1,075
5 2-dr. Sedan	1,005	5 4-dr. Sedan	1,105
5 Phaeton	1,075	5 Landau	1,165
4 Roadster	1,075		

PACKARD—6-26. 8-cyl. 126 W. B.

5 Sedan	2,275	2 Con. Coupe	2,425
2 Coupe	2,350		

PACKARD—6-33. 8-cyl. 133 W. B.

2 Runabout	2,375	5 Club Sedan	2,575
5 Phaeton	2,375	4 Coupe	2,575
7 Touring	2,475	7 Sedan-Lim.	2,675
7 Sedan	2,575		

PACKARD—6-40. 8-cyl. 140 W. B.

2 Runabout	3,175	4 Coupe	3,750
5 Phaeton	3,175	5 Club Sedan	3,750
2 Coupe	3,250	7 Sedan	3,750
7 Touring	3,275	7 Sedan-Lim.	3,850
2 Con. Coupe	3,350		

PACKARD—6-45. 8-cyl. 145 W. B.

2 Runabout	4,585	5 Coupe	5,795
7 Touring	4,585	5 Club Sedan	5,795
5 Phaeton	4,585	7 Sedan	5,795
5 Sot. Phaeton	4,935	7 Sedan-Lim.	5,985
2 Coupe	5,385		

PEERLESS—6-cyl. "61." 116 W. B.

2 Roadster	1,195	4 Victoria	1,245
2 Coupe	1,195	5 Sedan	1,295

PEERLESS—6-cyl. "81." 116 W. B.

5 Sp. Phaeton	1,545	5 Stand. Sedan	1,595
2 Coupe	1,595	7 Sp. Phaeton	1,595
4 Victoria	1,595		

PEERLESS—"Straight 8." "125." 130 W. B.

5 Sedan	2,195	Roadster	2,195
4 Victoria	2,195	2 Coupe	2,195

PEERLESS—"Straight 8." "125." 138 W. B.

7 Sedan	2,295		

PIERCE-ARROW—8-cyl. 133 W. B.

5 Club Brough.	2,775	5 Club Sedan	3,150
2 Coupe (RS)	2,875	7 Sedan	3,150
2 Sp. Road (RS)	2,875	7 En. Dr. Limo.	3,350
4 Spt. Phaeton	2,975	5 Club Berline	3,350
5 Sedan	2,975		

PIERCE-ARROW—8-cyl. Custom. 143 W. B.

7 Touring	3,750	7 Sedan	3,975
2 Con. Coupe (R. S.)	3,750	7 En. Dr. Lim.	4,250
		A. W. Town Car	5,750

PIERCE-ARROW—8-cyl. 143 W. B.
(Custom De Luxe)

5 Sedan Limo.	6,800	7 E. D. Limo.	7,000
5 A.W. Twn car	6,800	5 Con. Sedan	7,175
5-7 A.W. Cabri.	6,900	5 Con. Victoria	7,175
7 A.W. Twn car	7,000		

PLYMOUTH—4-cyl. 107 W. B.

Coupe	655	Touring	695
Roadster (RS)	675	DeL. Coupe (RS)	695
2-dr. Sedan	675	4-dr. Sedan	695

PONTIAC—6-cyl. 110 W. B.

2-dr. Sedan	745	Sport Cabriolet	845
Sport Roadster	775	4-dr. Sedan	845
Coupe	745	Sport Lan. Sed.	895
5 Spt. Phaeton	825		

REO—Flying Cloud. 6-cyl. 115 W. B.

Coupe (RS)	1,395	Sport Sedan	1,495
Sedan	1,395	Spt. Coupe (RS)	1,495

REO—Flying Cloud "Master." 121 W. B.

Brougham	1,595	Sedan	1,745
Coupe	1,625	Sport Coupe	1,750
Roadster	1,685	Sport Roadster	1,810
Victoria	1,695	Sport Victoria	1,820

ROOSEVELT—8-cyl.

5 2-dr. Sedan	995	4 Vic. Coupe	1,065
2 Coupe (RS)	995	Co. Coupe (RS)	1,095

STEARNS-KNIGHT—6-80. 126 W. B.

Cab. Roadster	2,195	5 Sedan	2,195
Cl. Coupe Sed.	2,195	2 Coupe (R. S.)	2,295

STEARNS-KNIGHT—6-80. 134 W. B.

5 Coupe	2,345	7 Limousine	2,645
7 Sedan	2,545		

STEARNS-KNIGHT—8-90. De Luxe. 137 W. B.

Roadster	5,500	5 Coupe	5,500
2 Coupe	5,500	5 Sedan	5,500
Cab. Roadster	5,500		

STEARNS-KNIGHT—J 8-90. De Luxe. 145 W. B.

7 Touring	5,500	7 Limousine	5,800
7 Sedan	5,600		

STUDEBAKER—Dictator. 6-cyl. 115 W. B.

2 Coupe	995	5 Tourer	1,095
Club Sedan	1,035	Regal Sedan (6 wire wheels and trunk rack)	1,195
4 Coupe	1,045		
Sedan	1,095		

STUDEBAKER—Dictator. 8-cyl. 115 W. B.

2 Coupe	1,185	Sedan	1,335
Club Sedan	1,235	Regal Sedan (6 wire wheels and trunk rack)	1,435
4 Coupe	1,235		
5 Tourer	1,285		

STUDEBAKER—Commander. 6-cyl. 120 W. B.

5 Tourer	1,350	rack)	1,495
2 Coupe	1,350	4 Con. Cabriolet (6 wire wheels and trunk rack)	1,495
Sedan	1,375		
Victoria	1,375		
4 Coupe	1,425	Brougham (mohair)	
5 Regal Tourer	1,450	(6 wire wheels and trunk)	1,525
4 Roadster (5 wire wheels)	1,450	Brougham (cloth) (6 wire wheels and trunk)	1,525
Regal Sedan (6 wire wheels and trunk)			

STUDEBAKER—Commander. 8-cyl. 120 W. B.

5 Tourer	1,495	trunk rack)	1,645
2 Coupe	1,495	Regal Sedan (6 wire wheels and trunk	
Victoria	1,525		
Sedan	1,525	rack)	1,645
4 Coupe	1,550	Brougham (mohair)	
5 Regal Tourer	1,595	(6 wire wheels and	
4 Regal Roadster (5 wire wheels)	1,595	trunk)	1,675
		Brougham (cloth), (6	
4 Con. Cabriolet (5 wire wheels and		wire wheels and trunk)	1,675

STUDEBAKER—President. 8-cyl. 125. W.B.

4 Roadster (5 wire wheels	1,745	Sedan. State (mohair) (6 wire	
Sedan	1,785	wheels and trunk	
4 Con. Cabriolet (6 wire wheels and trunk rack)	1,895	rack)	1,895
		Sedan. State (cloth) (6 wire wheels and trunk rack)	1,895
Victoria. State (6 wire wheels and trunk rack)	1,895		

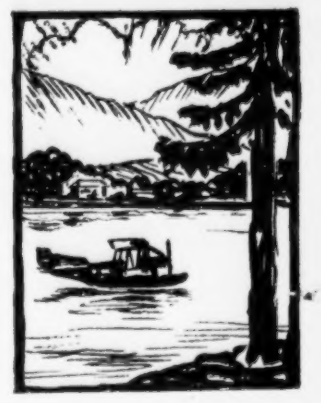
STUDEBAKER—President. 8-cyl. 135 W. B.

7 Tourer	1,785	7 Sedan.

Every S.A.E. Delegate at Saranac Lake

Will Be Interested

To Learn Something About Transportation



via KEYSTONE-LOENING AMPHIBIAN "AIR YACHT"

That industry thrives on new ideas is realized above all by members of the Society of Automotive Engineers. S. A. E. members will readily recognize, moreover, as one of the newest ideas in industry the company-owned airplane for the swift travel of executives and salesmen and for the delivery of goods when time is at a premium.

Of all types of planes of proven performance available to industry, none offers such all-around usefulness as the amphibian plane with its ability to alight on either land or water—thus affording travel by the shortest route between two points, with added safety all the way. Aeronautical engineers recognize in the Keystone-Loening "Air Yacht" the highest development of present-day amphibians. In selecting the Air Yacht for important work, Business follows in the footsteps of the various branches of the U. S. Government in which the Keystone-Loening Air Yacht is called upon for the unfailing fulfillment of difficult and hazardous missions.

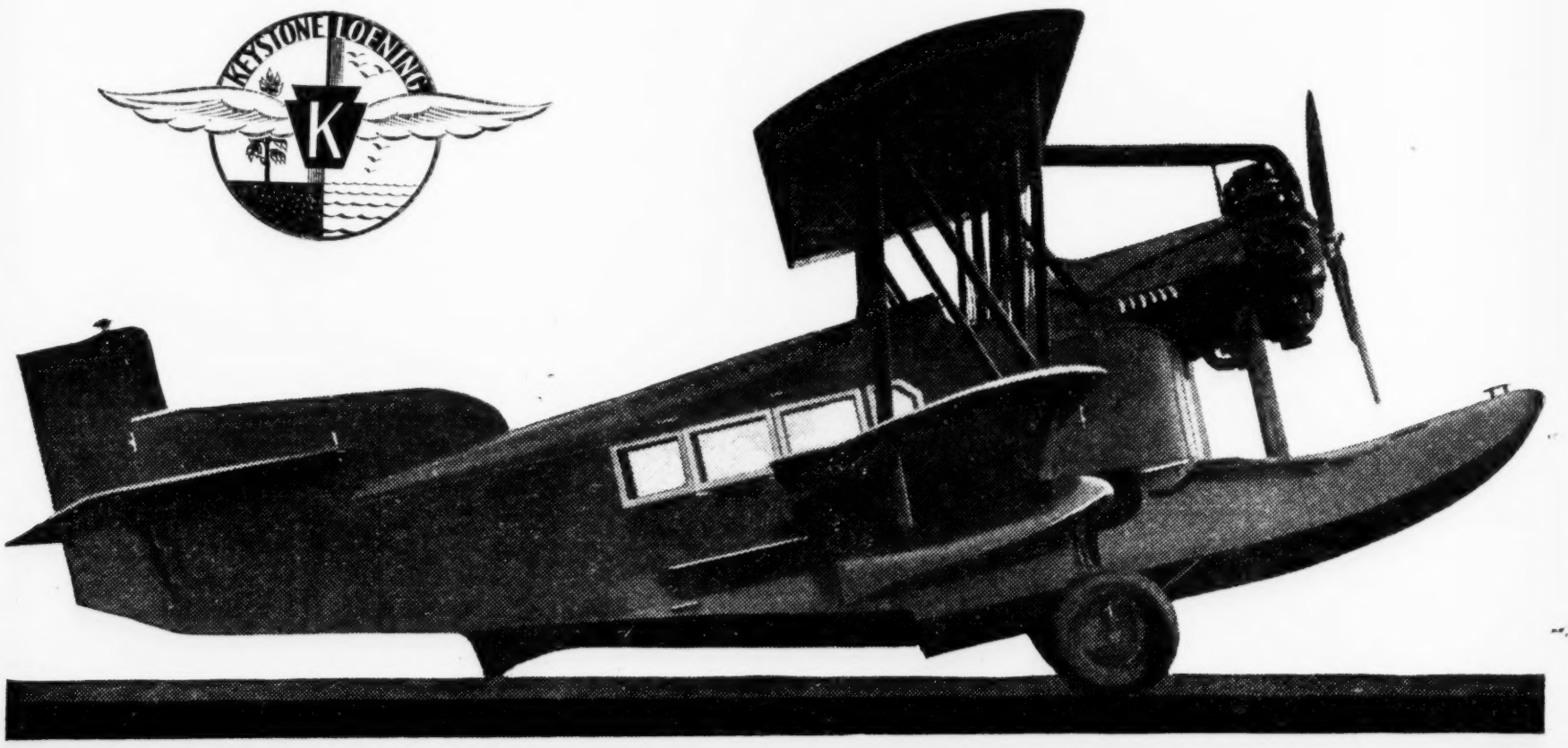
In over five million miles of flying, whether the job be the taking of mail off the Leviathan far at sea, the Alaskan Survey, Patrol Work by the U. S. Coast Guard, the Army Good-Will Trip in South America, or the more prosaic, but none the less important, work of daily transportation on regular air routes, the Air Yacht has proved its claim to supremacy over all ships of the type.

The Air Yacht was designed by Grover Loening, one of the foremost aeronautical engineers of the country and the recognized authority on the amphibian type of plane. It is powered with a Wright Cyclone 525 H. P. air-cooled engine, big brother of the famous Whirlwind. It carries a total of eight persons with a cruising range of over 500 miles on 140 gallons of gasoline. It has a maximum speed of 130 M. P. H., and a cruising speed of 105 M. P. H.

The Keystone-Loening Air Yacht is known the world over as "The Airplane that does the hard work for America."

KEYSTONE AIRCRAFT CORPORATION

SALES OFFICES: 31st STREET & EAST RIVER, NEW YORK
PLANTS: BRISTOL, PENNA., AND NEW YORK CITY
Distributors: NEW YORK, Cox & Stevens Aviation Corp.; BOSTON, East Coast Aircraft Sales Corp.; PHILADELPHIA, Ludington Philadelphia Flying Service; CLEVELAND-DETROIT, Thompson Aeronautical Corp.; PITTSBURGH, Pittsburgh Aircraft Agency Corp.; LOS ANGELES, W. E. Thomas; SEATTLE, Gorst Air Transport, Inc.; *SHANGHAI*, Andersen-Meyer & Co.; *SOUTH AMERICA*, B. Nicoll & Co., New York.



Financial News of the Automotive Industry

The A. D. N. Analyst Looks Them Over

ANDERSON MANUFACTURING COMPANY

THE ANDERSON MANUFACTURING COMPANY, makers of spring covers, was incorporated in 1920, and since that time has maintained its position as the country's leading manufacturer of spring covers.

This company now has its spring covers as standard equipment on six cars; namely, Cadillac, La Salle, Pierce-Arrow, Graham-Paige, Pontiac, Oakland and all Franklin custom models. It also supplies the accessory divisions of the H. H. Franklin Manufacturing Company and the Marmon Motor Car Company with covers.

In keeping with its policy of development, the Anderson Company recently completed arrangements with the Ajax Spring Stabilizer Company to manufacture and exclusively sell in the United States and Canada the Ajax metal cover. This new cover will be known as the "Anderson Ajax Metal Cover." Already two prominent car manufacturers have decided to use this type of metal spring cover as regular equipment on models in production within the next few months.

Increased production of the company has been in step with their research on materials for spring covers. Because of the fact that the founders of this company were connected with French, Shriner & Urner, manufacturers of high grade men's shoes, the Anderson company specialized for some time in the manufacture of genuine leather covers only. It was later found advisable to develop a spring cover of other materials, and the Anderson Company therefore placed a cover on the market in 1924, made of a specially prepared artificial leather. Both genuine and artificial leather covers are now being made by the Anderson company, and they embody many exclusive and interesting features.

For some time the company has produced from 2,500 to 2,600 sets of spring covers per day, but orders on hand at the present time indicate that this production will be materially increased.

The balance sheet as of May 31, 1929, showed a strong cash position. Total quick assets amounted to $174,818.79, as compared with total current liabilities of $82,573.98, the ratio in favor of the assets being better than two to one. Cash and marketable securities amounted to $73,372.98.

The authorized capital stock of the company consists of 400 shares of preferred stock with par value of $100, and 3,000 shares of common with par value of $10, of which there is issued and outstanding: Preferred stock, none; common stock, 3,000 shares. There is no funded debt.

The earned surplus as of May 31, 1929, amounted to $96,050.68.

In considering the balance sheet, it should be borne in mind that the business of the company is of such a nature that it is not necessary to finance purchases, therefore a ratio of two to one indicates a strong liquid position. This company manufactures spring covers on order only; therefore, it would follow that the inventory as shown on the balance sheet would be immediately turned over.

The company is fortunate in having advance contracts on its standard equipment business, thus strengthening its unfilled order position. These unfilled orders run several months in advance.

The officers of the compay are: W. G. Ferguson, president; George H. Hunt, vice-president; George L. Dernier, vice-president and sales manager; Everett L. Olds, vice-president and production manager; Warren T. Ferguson, treasurer and chief engineer; E. A. Merriam, secretary. The above also compose the board of directors.

The company's plant is located at Cambridge, Mass. Its Detroit representative is George H. Hunt, well known in automobile circles there.

ASSETS

Current Assets—		
Cash on hand and in bank	$55,479.59	
Accounts receivable	77,094.66	
Marketable securities	17,893.39	
Inventories	24,351.15	
Total current assets		$174,818.79
Fixed Assets—		
Machinery and equipment (less depreciation)	$15,351.67	
Patent rights and goodwill	$14,565.08	
Miscellaneous—		
Accumulated rebates on purchases	2,454.15	
Deferred charges	1,424.97	
Total assets		$208,624.66

LIABILITIES AND CAPITAL

Liabilities—		
Accounts payable	$52,986.76	
Accruals	20,745.28	
Reserve for taxes	8,841.94	
	$82,573.98	
Capital and Surplus—		
Common stock	$30,000.00	
Surplus	96,050.68	
	$126,050.63	
Total liabilities and capital		$208,624.66

UNITED STATES HAMMERED PISTON RING COMPANY, Inc.

THE UNITED STATES HAMMERED PISTON RING COMPANY, Inc., was incorporated under the laws of New Jersey in 1928, and since that time has shown consistent growth.

The company has a program of expansion under way at present that will give its New Jersey plants a capacity of 15,000 piston rings a day, or in excess of 4,000,000 per year. The main plant of the company is located at Irvington, N. J., the expansion including a new plant at St. Petersburg and another at Paterson, N. J.

The increased attention which is now being given to the development of the Diesel engine promises to become an important factor in the affairs of this company. Among its products are piston rings for the Diesel type of engine. All other types of piston rings are manufactured, including a ring which is adaptable to cylinders which have been worn out of shape.

The machinery used in the production of piston rings by this company was invented and patented by A. W. Wenzel, who is president of the concern.

Among the important customers of United States Hammered Piston Ring in 1928 were the Wright Aeronautical Corporation, Pratt & Whitney, Curtiss Aeroplane and Motor Corporation, Indian Motocycle Company, the United States government, Pierce-Arrow Motor Car Company and other motor companies.

The company has no funded debt and the capital stock consists of 100,000 shares of no par common stock authorized and outstanding. Forty thousand shares of the stock were offered to the public last December at $9 a share, after which it was listed on the New York Produce Exchange.

The officers of the company are Mr. Wenzel and H. N. Whitney, vice-president, secretary and treasurer. The fiscal year ends January 30 and the executive offices are in Irvington, N. J.

RANGE OF AUTOMOTIVE STOCKS

NEW YORK CURB MARKET

Sales		High	Low	Close	Net Chge
	Bendix Avia	No sales today			
	Borg Warner	No sales today			
800	Briggs & Strat	35⅜	35⅛	35⅜	— ⅛
1800	Bud'l Ed	17⅜	16¼	17⅜	+ ⅜
	Bullard Co	No sales today			
100	Caterpillar T	80½	80½	80½	+ ½
7300	Checker Cab	65½	62¾	63	—3½
34200	Cities Service	31⅞	31⅜	31¾	+ ⅛
200	do pf	96¼	96¼	96¼	
500	Con Di Fibre	36	36	36	+ ⅜
500	Doehler D C	31⅞	31	31⅞	— ⅛
5100	Durant Motor	13½	12	13⅜	— ⅛
100	Fageol Motor	4½	4½	4½	+ ⅛
	Fedders	No sales today			
	Federal Mogul	No sales today			
4100	Fiat	28⅜	28	28¼	
325	Firestone	275½	270	270	—4
	do pf	No sales today			
500	Ford Canada	46¾	45⅞	46⅛	— ⅜
4100	Ford Ltd	15⅞	15½	15½	— ⅛
200	Franklin Mfg	43½	42	43	— ⅛
	Gen T & Rub	No sales today			
	Gr'nfield T & D	No sales today			
	Hall Lamp	No sales today			
	Henney	No sales today			
	Hood Rubber	No sales today			
	India Tire	No sales today			
	Isotta Fras	No sales today			
	Jaeger	No sales today			
	Lakey	No sales today			
	Marvel Carb	No sales today			
	McQuay Norris	No sales today			
300	Nat Rub Mach	35	34⅝	34⅝	— ⅛
1400	Paramount Cab	16	15	15⅛	— ⅜
500	Perfect Circle	60½	60¼	60½	—1⅛
	Pines Winter	No sales today			
100	Pitts Pl Glass	64¼	64¼	64¼	
400	Raybestos	84⅛	84⅛	84⅜	+ ⅜
	Rep M T ctfs	No sales today			
	Rolls Royce Am	No sales today			
	Ross Gear	No sales today			
500	Safe T Stat	28¾	28	28¾	
	Seiberling	No sales today			
2500	Serv-el Inc	18⅛	17¾	17¾	— ⅛
	Sparks With	No sales today			
200	Stutz Motor	13	13	13	
100	Thermoid Co	29	29	29	
200	Thompson Prod	58¼	58¼	58¼	—1½
	Triplex	No sales today			
	U S Asbestos	No sales today			
700	Watson, J W	5⅜	5½	5½	— ⅛
200	Wayne Pump	19	19	19	—1
600	West Auto	71⅞	70½	71⅞	
	Wire Wheel	No sales today			
	Yellow Taxi N Y	No sales today			

NEW YORK OVER THE COUNTER

Div.		Bid	Asked
4	Am Hard Rubber	82	85
10	Dixon (J) Cruc	167	171
3.50	Doehler D C pf	38	42
5.25	do 75% pf	100	107
	Eisemann Magne	14	18
7	do pf	96	100
3.50	Manhattan Rubber	42	52
	Rolls Royce Am	19	23
	do pf	50	55
1.30	Smith (A O)	190	195
	Splitdorf Beth E	9	10
2	Ward La Fr Tr Co A	32	33

CHICAGO STOCK EXCHANGE

Sales		High	Low	Last
200	Acme Steel	102½	101½	102½
50	Ainsworth	53¼	53¼	53¼
1150	Allied Motor	44½	43	43½
100	do pf	49½	49⅜	49½
900	Allied Products	69	67¾	69
5800	Bendix Aviation	87⅜	85½	87
3400	Borg Warner	117	116½	116¾
1000	Chicago Yellow Cab	30½	29½	30⅜
550	Gen Spring Bump A	47½	46	47½
930	do B	47¾	47½	47¾
200	do A ctfs	47½	46¼	47½
900	do B ctfs	47¾	46	47¾
350	Houdaille Hersh A	47½	47	47½
550	do B	48½	47	48
50	McQuay Norris	67	67	67
100	Modine	68	68	68
50	Mohawk Rubber	44½	44½	44½
400	Muskegon Motor A	27	26¼	27
100	Noblit Sparks	43	43	43
750	Perfect Circle	60½	59¾	60½
250	Pines W F	66	65	65
100	Stand Motor Tr pf	32	32	32
200	Van Sicklen A	30	30	30
100	Wayne Pump	18	18	18
50	do pf A	36½	36½	36½

CLEVELAND STOCK EXCHANGE

Sales		High	Low	Last
160	Firestone 7s pf	108½	108½	108½
100	Goodyear	123⅝	123⅝	123⅝
36	Jaeger Machine	33¼	33	33¼
150	Mohawk Rubber	45	45	45
100	Packard Electric	37	37	37
10	Seiberling Rubber	40	40	40
50	Thompson Products	59	59	59

DETROIT STOCK EXCHANGE

Sales		High	Low	Last
210	Brown Mfg Co	49⅜	49½	49⅜
435	Federal Screw	69¼	68¾	69¼
300	Frost Gear	21¼	21¼	21¼
283	Gen Spring Bump	47	46¾	47
485	G R Metal	14	13⅞	14
290	Hall Lamp	23	23	23
300	Hutto	28¼	27½	27½
335	Packard new	27¼	27⅛	27⅛
900	Universal Products	41¼	41	41

Rubber Prices

New York, June 26.—Considerable tonnage of crude rubber passed into trade hands yesterday as commission house traders switched their holdings into the more distant positions. Setbacks in London and Singapore led to lower prices on the local Rubber Exchange, and futures wound up 10 to 20 points net lower. Turnover totaled 436 lots or 1,090 long tons.

RUBBER EXCHANGE OF NEW YORK

	High.	Low.	Close.	Prev. Close.
July	20.10	20.00	†20.10	20.20
August	....	....	*20.30	20.50
September	20.70	20.60	†20.70	20.80
October	21.00	21.00	*20.90	21.00
November	....	....	*21.10	21.20
December	21.30	21.30	†21.30	21.40
January	21.60	21.50	†21.60	21.70
February	....	....	*21.80	21.90
March	22.00	21.80	21.90a22.00	22.00
April	....	....	*22.00	22.10
May	....	....	*22.20	22.30
Spot	....	....	20.10	20.20
Sales, lots			436	460

*Nominal. †Trading.

NEW YORK STOCK EXCHANGE

TUESDAY, JUNE 25, 1929

Previous 1929 High	Previous 1929 Low	Div.		Sales	High	Low	Close	Net Change
324¼	221	4	Auburn Auto	5,200	335¾	317	335¼	+11½
104⅞	27	....	Advance Rumely	700	38⅜	38	38	....
119	40⅛	....	do pf	300	60	60	60	....
153⅞	95¼	3	Air Reduction	3,400	152¾	150	150	— ½
11¼	4½	....	Ajax Rubber	200	5⅜	5⅝	5⅜	....
252	156	7	Allis Chalmers	6,800	264½	249	264	+13
....	....	....	do pf	No sales today				
73¼	40½	....	Am. Bosch Magneto	1,800	59¾	58½	59¼	— ⅛
....	....	....	Am. Chain Class A pf	No sales today				
8⅞	4½	....	Am.-La France	300	5	4¾	4¾	— ¼
136¾	110¼	3	Bohn Aluminum	3,400	122½	116	122	+ 6
63⅛	30½	....	Briggs Mfg. Co.	4,500	34¾	34	35	+ ⅝
73⅞	42½	3	Brockway Motor	2,400	51⅝	50⅛	51⅛	— ⅝
39⅜	28¼	....	Chicago Pneu. Tool	200	34¼	34	34¼	+ ⅛
....	....	....	Chicago Yellow Cab	No sales today				
135	66	3	Chrysler Corp.	18,600	75⅝	74⅛	75⅛	+ ⅝
....	....	....	do pf	No sales today				
62⅝	43	2	Commercial Credit	11,600	54	49	54	+ 4
98½	85	....	do 6¼s pf	10	92½	92½	92½	+ ½
195	131½	4	Com. Invest Trust	600	165	163¾	165	— ¾
....	....	....	do pf	No sales today				
28¾	17	....	Continental Motors	6,200	17⅝	16¾	17⅛	— ⅝
65¾	58⅛	3.50	Cutler-Hammer	4,100	64⅜	61⅜	64⅛	+ 2¾
198½	155¾	4	Du Pont	12,900	183	176	181½	+ 6½
76⅞	56	3	Eaton Axle & Spring	500	61½	60⅝	61½	— ½
172	126¾	6	Electric Auto-Lite	28,100	166⅝	159¼	166½	+ 6
92⅞	77	5	Elec. Stor. Battery	1,800	84⅜	83⅛	83⅜	....
73¾	55	2.50	Evans Auto Load	400	61	60½	60½	— 2
....	....	....	Emerson Brant	No sales today				
....	....	....	do pf	No sales today				
22⅜	13⅜	.80	Federal Motors	300	14	14	14	....
20⅛	7⅝	....	Fisk Rubber	2,500	9⅛	8⅞	9⅛	+ ⅛
72½	45	....	do 1st pf	100	45	45	45	....
33⅞	20	....	Gabriel Snubber	1,100	26½	26	26	— ⅜
310	219	4	General Electric	36,500	311	299¼	309	+ 9
25	10½	....	Gardner Motor	300	14	13½	13½	— ½
91⅞	68⅜	3	General Motors	88,500	76⅛	74⅛	75⅛	+ ⅜
....	....	....	do pf	No sales today				
126½	122½	7	do 7s pf	900	123½	123	123½	+ ½
....	....	....	do deb	No sales today				
58¼	36⅞	1.50	Glidden Co.	3,500	57	55⅜	56½	— ⅜
....	....	....	do pf	No sales today				
105¾	73	4	Goodrich	3,600	81¼	79⅛	80¼	+ 1¼
....	....	....	do pf	No sales today				
154½	112	5	Goodyear T. & R.	10,700	126⅝	123	125¼	+ 2⅛
104⅞	101	7	do pf	400	101¼	101¼	101¼	— ⅝
54	25	....	Graham-Paige Motor	4,800	33⅝	32½	32¼	— 1⅛
68¾	34⅛	8	Hayes Body	1,700	42	40⅝	41¼	+ ⅛
58¾	54½	2.50	Hudson Motor Car	2,300	40⅞	40½	40⅝	+ 1
93½	75⅛	5	Hupp Motor Car	3,400	85⅞	85½	85½	....
32½	17¾	....	Indian Motocycle	900	22⅞	22½	22¾	+ 1⅜
14¼	8⅛	....	Intercon. Rubber	100	9	9	9	....
119¾	92	2.50	Internat. Harvester	1,600	107½	106¾	106¾	— ⅛
....	....	....	do pf	No sales today				
242¾	152½	3	Johns-Manville	4,200	185	179	184	+ 3¾
16½	6	....	Jordan Motor Car	400	7¼	7¼	7¼	+ ⅛
24	11	....	Kelly-Springfield	2,200	16½	15¾	16¼	+ ⅜
....	....	....	do 6s pf	No sales today				
....	....	....	do 8s pf	No sales today				
59¾	40¼	2	Kelsey-Hayes Wheel	4,900	50⅜	49⅜	50¼	+ 1
....	....	....	do pf	No sales today				
25	10	....	Lee Rubber & Tire	2,100	15¼	14	15¼	— ⅛
61	49⅞	2.60	Link Belt	100	50¼	50¼	50¼	....
114⅜	91	6	Mack Trucks	1,100	98	97¼	97½	— ½
104	66⅜	4	Marmon	5,100	90⅞	89½	89½	— ⅞
89⅞	09⅛	2	Marlin Rockwell	2,000	81¾	79¾	80⅜	+ ⅜
....	....	....	Martin Parry	No sales today				
34⅞	20	....	Mengel	14,000	27⅛	24½	26¼	+ 2⅛
28⅞	19⅛	....	Miller Rubber	300	19	18⅞	18⅞	— ⅛
8	4	....	Moon Motors	100	4½	4½	4½	— ¼
19	16½	....	Moto Meter A	200	17¾	17¾	17¾	....
206	96½	2	Motor Products	300	118¾	113⅝	118	+ 4⅝
48⅜	39	2	Motor Wheel Corp	4,100	45¼	42⅜	45¼	+ 3½
81⅞	42¼	2	Mullins Mfg.	1,200	47	46	46	— ⅞
100⅞	62	3	Murray Corp.	13,300	93⅞	91⅝	93⅜	+ ⅞
118⅞	81⅛	6	Nash Motors	3,700	85	84¼	85	— ⅛
....	....	....	do pf	No sales today				
6¼	3	....	Norwalk T. & R.	400	3⅛	3	3⅛	— ⅛
....	....	....	do pf	No sales today				
10⅞	7½	....	Omnibus Corp.	1,500	9⅜	9	9	....
48⅜	37	....	Otis Steel	17,600	44½	41⅞	44⅜	+ 2⅜
153⅛	116½	3	Packard Motor Car	8,100	133⅛	131⅛	133	+ ¼
22½	11⅜	....	Peerless Motor Car	1,000	12⅞	12¼	12⅜	+ 1⅛
37¾	27½	....	Pierce-Arrow	100	31⅞	31½	31⅞	+ ⅛
....	....	....	do pf	No sales today				
31⅞	21⅛	.80	Reo Motors	2,200	23⅜	23	23⅜	+ ⅛
12¼	6	....	Reynolds Spring	100	7½	7½	7½	....
55⅞	45½	3	Spicer Mfg. Co.	100	46¼	46¼	46¼	— ¼
....	....	....	do pf	No sales today				
77	65	3.50	Stewart-Warner Spd	25,100	75½	72½	74⅝	+ 2
....	....	....	Stromberg Carbur	No sales today				
98	73½	5	Studebaker Co.	1,300	78½	77¼	78½	+ 1
125½	123	7	do pf	60	126	126	126	+ 1
31	21¾	.80	Timken Det. Axle	900	25⅞	25⅝	25⅝	— ⅝
100½	73½	3	Timken Roller Bear	15,200	101⅜	98¼	101	+ 2
59⅜	38⅜	2.50	Trico	1,300	57½	55¼	56¼	— ⅝
65	42	....	U. S. Rubber	3,400	52⅞	51⅝	52⅜	+ ⅜
92½	73	....	do 1st pf	800	78½	77¼	78½	+ 1⅜
42⅞	28½	2	Warner Quinlan	1,800	31⅝	31¼	31¼	— ⅜
54½	43⅛	2	Westinghouse A. B.	1,900	47¾	46¾	47½	+ ⅜
53½	38	1	White Motors	1,000	42½	42½	42½	+ ⅛
35	20	1.20	Willys-Overland	3,300	22⅞	22⅜	22⅝	— ⅜
103	94	7	do pf	200	92	92	92	— 1¼
73½	61⅜	4	Yale & Towne	100	72½	72½	72½	— ½
51⅛	34⅜	....	Yellow Tr. & Coach	4,600	42	40½	41¾	— ⅛
....	....	....	do pf	No sales today				

OUTSIDE CLOSING PRICES

(Per pound, delivered, New York.)

	Bid.	Asked.
PLANTATION—		
Ribbed Smoked Sheets—		
Spot	20⅜	20¼
June	20½	20⅝
July	20¾	20⅝
July-September	20½	20⅝
October-December	21¼	21½
Spot—		
First latex crepe	21½	21¾
Thin pale latex	22	22¼
Clean thin brown crepe	18	18⅛
†Specky crepe	17⅛	17⅞
Rolled brown crepe	14	14⅛
No. 2 amber	18¼	18½
No. 3 amber	18	18¼
No. 4 amber	17¾	18
*PARAS—		
Up-river, fine, spot	21⅜	22¼
do, coarse	13	13½
Accra, fine, spot	23¾	23
Caucho, Ball—Upper	12	12¼
CENTRALS—		
*Esmeraldas	..	13
*Central scrap	..	13
Guayule, washed, dried	..	19
†BALATA—		
*Block Ciudad	54	..
*Surinam sheet	56	..
*Manaos block	55	..
Peruvian block	35	26

SCRAP RUBBER

(Dealers' buying prices, f. o. b., N Y.)

Boots and shoes, black, ton	$18.00a20.00
Arctics, cwt	.50a .60
Inner tubes, mixed, cwt	3.50a 3.75
Inner tubes, red, cwt	4.50a 4.75
Tires, standard, mixed, ton	18.00a19.00
Inner tubes, No. 1, cwt	6.50a 6.75
Inner tubes, No. 2, cwt	3.50a 3.75
Mixed hose, soft, cwt	.50a .55
Hose, air brake, ton	24.50a25.00

*Nominal. †Sold on sample only.

G. M. DIRECTORS RETURN OVERSEAS

Export Company Also Reports Sailings of Branch Heads

NEW YORK, June 26.—A d d itional managing directors of overseas assembly plants and warehousing operations of the General Motors Export Division, who have been in the United States to attend a managing directors' conference held May 22-30 at Shawnee-on-Delaware, Pa., and later made a tour of inspection of General Motors operations in Canada, Michigan and Ohio, are returning to their posts overseas.

Innes Randolph, managing director of General Motors Australia, will sail for Melbourne tomorrow on the Ventura from San Francisco. Also on the Ventura will be Desire Bardin, manager of the Melbourne branch of General Motors Australia. He will be acompanied by Mrs. Bardin.

E. M. Van Voorhess, managing director of General Motors Japan, Ltd., will sail for Osaka Saturday on the President Jefferson.

G. P. Harrington, managing director of General Motors Java, will sail for Batavia on the President Jefferson.

C. R. Evans of the president's staff, London, sailed for England June 22 on the Minnetonka.

D. J. Grout of the advertising division sailed for Alexandria, Egypt, June 15 on the President Roosevelt to take up new duties as advertising manager of General Motors Near East. He was accompanied by his family.

G. C. Phillips of the general manufacturing department will sail for Sao Paulo, Brazil, June 28 on the Southern Cross. After spending some time at the plant of General Motors Brazil, Mr. Phillips will go to General Motors Argentina at Buenos Aires and also visit General Motors Uruguay at Montevideo before returining to New York.

T. G. Eyebye, former sales manager of General Motors Japan, who has been on a vacation in Europe, arrived in New York June 24 on the New York for a visit to the home office and new assignment.

G. B. Roberts, treasurer of General Motors Australia, Brisbane branch, who has been here on a vacation and visit to the home office sailed for Melbourne today on the Niagara. Mr. Roberts will be accompanied by his family.

W. G. Guthrie, regional production manager for Europe, who has been here attending the managing directors' conference of the General Motors Export Division, sailed for London June 21 on the Majestic.

W. L. Malone, analysis manager of General Motors Java, who has been here on a vaction and visit to the home office, returned to Batavia on June 15 on the President Roosevelt. He was accompanied by his family.

George B. Slevin of the Fisher Body Corporation sailed for Bombay today on the America for a visit to General Motors India. Before returning to New York, Mr. Malone will also visit General Motors Java, at Batavia; General Motors Japan, Ltd., at Osaka, and stop at the Philippine Islands to visit the Manila branch.

Sailing from Seattle Saturday on the President Jefferson for General Motors Japan, at Osaka, were E. C. Bolger of the advertising division, who will spend approximately six months at Osaka, and then visit General Motors India, at Bombay; C. L. Woolsey of the advertising division, who has recently been appointed assistant to the sales manager of General Motors Japan; R. M. Wachtler, formerly of the general sales department, who has been made assistant to the managing director of General Motors Japan, and W. D. Whitelaw of the financial control division, who will spend some months visiting the General Motors plants at Osaka, Japan; Batavia, Java, and Bombay, India, before returning to the home office.

A. C. Connellee, assistant to the general manufacturing manager, sailed for Buenos Aires on June 22 on the Voltaire to assume new duties as regional production manager for South America.

V. R. Carcia of the analysis division, sailed for Buenos Aires June 22 on the Voltaire to assume new duties on sales work for General Motors Argentina. He was accompanied by his family.

TODAY'S NEW PASSENGER CAR REGISTRATIONS FOR MAY, 1929

These Returns are carried in Automotive Daily News from day to day as received up to hour of publication. Recapitulation of these daily reports is published every Saturday

Figures in this table are from R. L. Polk & Co. of Detroit, with the exception of Illinois, which are supplied by the Robinson Advertising Service, Springfield, Ill., and New Jersey, which are furnished by the New Jersey Motor List Co., New Car Division, Trenton, N. J. Readers desiring county, city or town lists, or lists of owners in any given section, may obtain these by addressing any of these three companies.

States	Auburn	Black Hawk	Buick	Cadillac	Chevrolet	Chrysler	DeSoto	Dodge	Durant	Elcar	Erskine	Essex	Ford	Franklin	Gardner	Graham-Paige	Hudson	Hupmobile	Jordan	La Salle	Lincoln
Florida	10		102	14	857	65	27	71	7		12	124	1582	13	1	80	48	33		10	3
Wash'gton	41		230	13	929	134	104	164	244		59	287	1868	11		72	77	65		19	5

States	Locomobile	Marmon	Nash	Oakland	Oldsmobile	Packard	Peerless	Pierce-Arrow	Plymouth	Pontiac	Reo	Roosevelt	Stearns-Knight	Studebaker	Stutz	Viking	Whippet	Willys-Knight	Windsor	Miscellaneous	Totals
Florida		1	50	20	47	20		9	60	102	13	2		26	1	6	116	14		2	3548
Wash'gton		7	131	29	149	44	5	4	212	188	23	26	1	181	5	5	168	69		9	5581

Jordan Introduces New Lines of Eights and Sixes

(Continued from Page 1)

the country, from Maine to Virginia, make up the Jordan Distributors, Inc., and have already given orders which aggregate 2,500 cars. This is the outgrowth of the chain store idea as applied to the automobile business. It means that the selling systems are standardized both in new and used cars and a unified head over the whole system although each unit is complete in itself.

The new Eighty line wheelbase is 120 inches. Following are detailed specifications:—

Engine—Eight-cylinder, 2⅞-inch bore, 4¾-inch stroke, developing 80 horse power at 3,000 r. p. m. Torque, 160-foot pounds. Force feed lubrication to all crank shaft, cam shaft and connecting rod bearings, with direct flow to chain and sprockets. Pistons and piston pins lubricated by spray from connecting rods.

Pistons—Light weight steel strut aluminum alloy split skirt.

Piston Pins—Steel case hardened, lapped and burnished.

Electrical System—Single wire, 6-volt, two-unit system. Starting motor with Bendix drive. Waterproof distributor and coil. Three-cell, 6-volt battery, fifteen-plate, 105 ampere-hour capacity.

Carburetor—Plain tube type with idle and high speed adjustments. Equipped with accelerator pump and air cleaner.

Cam Shaft—One-piece drop forging of selected steel, fully machined and supported on five babbitt bearings.

Connecting Rods—Drop forged steel. Crank shaft bearing is babbitt cast in rod by centrifugal force.

Crank Shaft—Drop forged of selected steel, double heat treated. Dynamically and statically balanced. Drilled to permit oil under pressure to be forced to connecting rod bearings.

Fuel System—Fuel pump with sediment trap, operated by cam shaft. Electric gas gauge. Seventeen-gallon gasoline tank.

Clutch—Single plate dry disc spring drive 9¾-inch diameter. Ball type clutch throwout bearing. Roller type clutch shaft pilot bearing.

Transmission—Main shaft mounted on ball bearings with bronze bearing pilot. All gears chrome steel, oil hardened. Easy, silent action.

Propeller Shaft—Seamless steel tubing, forged ends electrically welded. Two oil-tight metallic type universal joints.

Frame—Pressed steel, seven-inch channel, wide flange, six cross members. Three gusseted cross bars and three torsion resisting tubular members.

Rear Axle—Banjo type pressed steel housing. Semi-floating. Bearings at wheel ends, opposed taper roller, adjustable by shims. Differential end pinion shaft mounted in taper roller bearings. Axle shaft of forged high alloy chrome steel, heat treated.

Front Axle—Drop forge center I-beam section. Anti-friction steering spindle thrust bearing. Wheel bearings taper roller adjustable.

Steering Gear—Worm and sector. Worm mounted on two tapered roller bearings fully adjustable for wear. Ratio 16 to 1. Safety steering wheel eighteen inches in diameter, of one-piece steel clamping, covered with molded rubber. Specially constructed with weighted hub to prevent road shocks being transmitted to rim of wheel. Adjustable for position.

Brakes—Four-wheel hydraulic, internal expanding. Weather-proof. Hand brake on transmission main drive shaft.

Lamps—Special design double filament bulb. Chrome-plated head lamps, cowl lamps, combination stop and tail lamp. Instrument panel indirectly lighted. Separate light for coincidental lock operated by a separate switch.

Fenders and Running Boards—Fenders heavy sheet steel, full crowned, baked enamel. Wood running boards, rubber ribbed mats with chrome-plated moulding.

Shock Absorbers—Hydraulic, front and rear.

Spring Shackles—Oilless, shock-absorbing, noise-insulating spring shackles—specially constructed with flexible tapered rubber bushings.

Bodies—Full vision custom type with adjustable front seat in closed cars. Wood and steel frame with sheet metal panels. Windshield opens and closes by operating small hand crank.

The Jordan Eight-Ninety line of cars on 131-inch wheelbase are practically the same as those introduced at the New York Automobile Show, but with many refinements which have been made recently.

SUCCESS STARTS WITH THE RIGHT PRODUCT

NASH

NASH dealers the country over are doing an increased business—*greatly increased!*

Their success is the talk of the industry today—and everybody knows the reason—*the Nash "400."*

Always a strong favorite with the American Public—always regarded as a car it was no mistake to buy—Nash has won new hosts of staunch friends, by the appearance, performance and unquestionable value of the "400."

Everywhere you go you hear high praise for the new and advanced engineering features of the Nash "400"—"Twin Ignition motor"—"World's easiest steering"—"Bijur Centralized Chassis Lubrication"—"Seven bearing, hollow-crankpin crankshaft."

With these outstanding features, and with a price range from $885 to $2190, there is a "400" for practically every prospect who comes in to see the car his friends have recommended.

For full information concerning available territory address the Sales Department, The Nash Motors Company, Kenosha, Wisconsin.

NASH "400"

LEADS THE WORLD IN MOTOR CAR VALUE

(799)

Buick Dealers'

repeat business alone

exceeds the total production of any other car in the Buick field!

One of the vital advantages inherent in the Buick franchise—one of the basic reasons for Buick dealers' consistent success—is Buick's exceptional volume of sales to former Buick owners!

Even if their market were limited to these owners *alone,* Buick dealers would sell more Buicks than the total production of any other quality car—*for more than 80 per cent of all Buick owners buy Buicks again and again!*

This vast family of loyal owners—plus the ever-increasing number of new buyers—creates a demand more than double that of any other car priced above $1200, and assures substantial and lasting returns for Buick dealers.

BUICK MOTOR COMPANY, FLINT, MICH.
Division of General Motors Corporation

Canadian Factories
McLaughlin-Buick, Oshawa, Ont.

Builders of
Buick and Marquette Cars

WHEN BETTER AUTOMOBILES ARE BUILT
BUICK WILL BUILD THEM

THOSE DESIRING THE BUICK FRANCHISE SHOULD HAVE THEIR NAMES ON FILE